





THE BIRDS OF AUSTRALIA

THE
BIRDS
OF
AUSTRALIA

BY
GREGORY M. MATHEWS
F.R.S.E.

MEMBER OF THE AUSTRALIAN ORNITHOLOGISTS' UNION
AND THE BRITISH ORNITHOLOGISTS' UNION
CORRESPONDING FELLOW OF THE AMERICAN ORNITHOLOGISTS' UNION

WITH HAND-COLOURED PLATES

VOLUME IV.

WITHERBY & CO.
326 HIGH HOLBORN LONDON
1914 — 1915



f GL
693
M42
1910
V. 1
C. 2
SCNHRB

CONTENTS

AND

LIST OF PLATES.

	PAGE
Order ANSERIFORMES	1
Genus CHENOPSIS	10
No. 252. BLACK SWAN, <i>Chenopsis atrata</i>	12
Plate 200 lettered <i>Chenopsis atrata</i> , to face	12
Genus ANSERANAS	23
No. 253. PIED GOOSE, <i>Anseranas semipalmata</i>	25
Plate 201 lettered <i>Anseranas semipalmata</i> , to face	25
Genus CHENISCUS	32
No. 254. WHITE-QUILLED GOOSE-TEAL, <i>Cheniscus coromandelianus</i> <i>albipennis</i>	35
Plate 202 lettered <i>Nettapus albipennis</i> , to face	35
No. 255. GREEN GOOSE-TEAL, <i>Cheniscus pulchellus</i>	38
Plate 203 lettered <i>Nettapus pulchellus</i> , to face	38
Genus CEREOPSIS	42
No. 256. CAPE BARREN GOOSE, <i>Cereopsis novæhollandiæ</i>	44
Plate 204 lettered <i>Cereopsis novæhollandiæ</i> , to face	44
Genus CHENONETTA	51
No. 257. WOOD-DUCK or MANED GOOSE, <i>Chenonetta jubata</i>	53
Plate 205 lettered <i>Chenonetta jubata</i> , to face	53

THE BIRDS OF AUSTRALIA.

	PAGE
Genus DENDROCYGNA	60
No. 258. WHISTLING DUCK, <i>Dendrocygna javanica australis</i>	62
Plate 206 lettered <i>Dendrocygna gouldi</i> , to face	62
Genus CTENANAS	67
No. 259. PLUMED WHISTLING DUCK, <i>Ctenanas eytoni</i>	68
Plate 207 lettered <i>Dendrocygna eytoni</i> , to face	68
Genus RADJAH	72
No. 260. WHITE-HEADED SHELD-DRAKE, <i>Radjah radjah</i>	
<i>rufitergum</i>	74
Plate 208 lettered <i>Tadorna rufitergum</i> , to face	74
Genus CASARCA	77
No. 261. MOUNTAIN DUCK, <i>Casarca tadornoides</i>	78
Plate 209 lettered <i>Casarca tadornoides</i> , to face	78
Genus ANAS	84
No. 262. BLACK DUCK, <i>Anas superciliosa rogersi</i>	85
Plate 210 lettered <i>Anas superciliosa</i> , to face	85
Genus VIRAGO	95
No. 263. GREEN-HEADED TEAL, <i>Virago castanea</i>	97
Plate 211 lettered <i>Nettion castaneum</i> , to face	97
No. 264. SLENDER or GREY TEAL, <i>Virago gibberifrons rogersi</i>	102
Plate 212 lettered <i>Nettion rogersi</i> and <i>Nettion castaneum</i> , to face	102
Genus QUERQUEDULA	114
No. 265. EASTERN GARGANEY TEAL, <i>Querquedula querquedula</i>	
<i>humeralis</i>	115
Genus SPATULA	117
No. 266. EASTERN SHOVELER, <i>Spatula clypeata indiana</i>	118
No. 267. AUSTRALIAN SHOVELER, <i>Spatula rhynchotis rhynchotis</i>	120
Plate 213 lettered <i>Spatula rhynchotis</i> , to face	120

CONTENTS.

	PAGE
Genus MALACORHYNCHUS	123
No. 268. PINK-EARED DUCK, <i>Malacorhynchus membranaceus</i>	124
Plate 214 lettered <i>Malacorhynchus assimilis</i> , to face	124
Genus STICTONETTA	128
No. 269. FRECKLED DUCK, <i>Stictonetta naevosa</i>	129
Plate 215 lettered <i>Stictonetta branda</i> , to face	129
Genus NYROCA	131
No. 270. WHITE-EYED DUCK, <i>Nyroca australis</i>	133
Plate 216 lettered <i>Nyroca australis</i> , to face	133
Genus ERISMATURA	136
No. 271. BLUE-BILLED DUCK, <i>Erismatura australis</i>	138
Plate 217 lettered <i>Oxyura australis</i> , to face	138
Genus BIZIURA	141
No. 272. WESTERN MUSK DUCK, <i>Biziura lobata lobata</i>	143
Plate 218 lettered <i>Biziura westralis</i> , to face	143
No. 273. EASTERN MUSK DUCK, <i>Biziura lobata menziesi</i>	147
Order PELECANIFORMES	152
Genus PHALACROCORAX	161
No. 274. BLACK CORMORANT, <i>Phalacrocorax carbo novæhollandiæ</i>	164
Plate 219 lettered <i>Carbo novæhollandiæ</i> , to face	164
Genus MESOCARBO	173
No. 275. LITTLE BLACK CORMORANT, <i>Mesocarbo ater ater</i>	174
Plate 220 lettered <i>Carbo sulcirostris</i> , to face	174
Genus HYPOLEUCUS	177
No. 276. WHITE-BREASTED CORMORANT, <i>Hypoleucus fuscescens</i>	179
Plate 221 lettered <i>Carbo gouldi</i> , to face	179
No. 277. PIED CORMORANT, <i>Hypoleucus varius perthi</i>	184
Plate 222 lettered <i>Carbo hypoleucos</i> , to face	184

THE BIRDS OF AUSTRALIA.

	PAGE
Genus MICROCARBO	188
No. 278. LITTLE CORMORANT, <i>Microcarbo melanoleucus melano-</i> <i>leucus</i>	189
Plate 223, lettered <i>Carbo melanoleucos</i> , to face	189
Genus ANHINGA	193
No. 279. DARTER, <i>Anhinga novæhollandiæ</i>	195
Plate 224 lettered <i>Plotus novæhollandiæ</i> , to face	195
Genus PISCATRIX	199
No. 280. AUSTRALIAN RED-LEGGED GANNET, <i>Piscatrix sula rubripes</i>	210
Plate 225 lettered <i>Sula rubripes</i> , to face	210
Genus SULITA	217
No. 281. AUSTRALIAN GANNET, <i>Sulita serrator dyotti</i>	219
Plate 226 lettered <i>Sula serrator</i> , to face	219
Genus PARASULA	225
No. 282. AUSTRALIAN MASKED GANNET, <i>Parasula dactylatra</i> <i>personata</i>	226
Plate 227 lettered <i>Sula personata</i> , to face	226
Genus SULA	230
No. 283. AUSTRALIAN BROWN GANNET (BOOBY), <i>Sula leucogaster</i> <i>plotus</i>	231
Plate 228 lettered <i>Sula leucogaster</i> , to face	231
Genus FREGATA	236
No. 284. GREATER FRIGATE BIRD, <i>Fregata minor listeri</i>	240
Plate 229 lettered <i>Fregata palmerstoni</i> , to face	240
No. 285. EASTERN LESSER FRIGATE BIRD, <i>Fregata ariel ariel</i>	282
No. 286. WESTERN LESSER FRIGATE BIRD, <i>Fregata ariel tunnyi</i>	288
Plate 230 lettered <i>Fregata ariel</i> , to face	288
Genus SCÆOPHÆTHON	291
No. 287. RUDDY TROPIC BIRD, <i>Scæophæthon rubricauda novæ-</i> <i>hollandiæ</i>	295
No. 288. WESTRALIAN RED-TAILED TROPIC BIRD, <i>Scæophæthon</i> <i>rubricauda westralis</i>	304
Plate 231 lettered <i>Phæthon westralis</i> , to face	304

CONTENTS.

	PAGE
Genus LEPTOPHÆTHON	306
No. 289. WHITE-TAILED TROPIC BIRD, <i>Leptophæthon lepturus</i>	
<i>dorotheæ</i>	307
Plate 232 lettered <i>Phæthon dorotheæ</i> , to face . . .	307
Genus CATOPTROPELICANUS	312
No. 290. AUSTRALIAN PELICAN, <i>Catoptropelicanus conspicillatus</i> .	314
Plate 233 lettered <i>Pelecanus conspicillatus</i> , to face . .	314

PREFACE.

THE completion of my fourth volume calls for little comment, but I appreciate the slow and steady progress made in ornithological study since I commenced my work.

Since my third volume was finished, I have visited Australia and made the personal acquaintance of my numerous valued correspondents, previously known by letters and gifts only. It would be superfluous to enlarge upon the pleasure which such meetings gave me, and I feel that the previous good feeling has been strengthened by the personal communication. I cannot thank each ornithologist in this place for his welcome, as it would practically mean a recognition of all the members of the Royal Australasian Ornithologists' Union, but I must put on record my appreciation of the kindnesses I met with over the whole of Australia and the fact that the interchange of ideas with many of my apparent opponents was marked with the greatest of courtesy, and I am certain we have all benefited by the intercourse. Consequently the sentiments expressed in the preface to the last volume, as regards the help I received from local workers, must now be emphasized as from personal friends.

I there suggested that the "tiresome" matter of nomenclature was reaching an easy conclusion and I am pleased to confirm this statement, as since my visit prominent Australian ornithologists such as Mr. A. H. Mattingley, the President of the Union, and Mr. H. L. White have communicated views confirming my own conclusions, which were only those of the extra-Australian scientific world. I now anticipate a comparatively speedy result in the usage of a uniform nomenclature.

The ultra-conservative Committee of the British Ornithologists' Union have published their List, and it is remarkable in that it professes to use a policy of "Nomina Conservanda," but was only able to suggest 13 out of 475 as worthy of such consideration. A semi-policy of binomial usage as against trinomials was also proposed, with the result that it is already a proved failure, and a fully trinomial system will ere long be as universal in British avian nomenclature as it will be in that of Australia.

THE BIRDS OF AUSTRALIA.

My friends, whose help I have repeatedly acknowledged, have all continued with notes and specimens and some new ones need recognition, such as Mr. H. C. Thompson of Tasmania, Mr. M. J. Colclough of Brisbane, and Dr. E. Dombain of Sydney.

Capt. S. A. White, Mr. H. L. White, Dr. Macgillivray, Mr. Tom Carter, and Mr. H. A. Purnell have again placed me under special obligation for their invaluable aid with regard both to specimens and observations, but it is almost an invidious task to specially mention any when all the Australian ornithologists, such as Messrs. Ashby, Hill, Howe, Tregellas and Wilson, etc., etc., were so generous in their efforts to aid and assist me in every way.

G. M. M.

FOULIS COURT,
FAIR OAK, HANTS.
June, 1915.

ORDER—ANSERIFORMES.

THE birds constituting this Order comprise a homogeneous assemblage of swimming birds with webbed feet, peculiar, usually broad, more or less flattened bills, provided with lamellæ on the edges of the mandibles and a more or less prominent nail. They vary in size from very large birds with very long necks to rather small birds with short necks, but are always recognisable as referable to this Order at first sight. Every gradation between these extremes seems to persist so that a good scheme of classification is difficult to produce. Scarcely two birds exactly agree as to structural details and similar schemes of coloration, so that almost every bird has at some time or other been given a generic name. In a few cases the coloration has been retained, though great variation in the hard parts has taken place, while in others, birds showing opposite styles of coloration seem to possess the same structural characters.

Sundevall in the *Tentamen*, 1873 (cf. Nicholson's *Translation*, 1889, p. 239), neatly summarised the position thus: "The six divisions here put forward, marked *a-f*, if one looks at the typical genera, are very distinct, and differ not less than the families of the *Cichlomorphæ* or *Mellisugæ*, but they scarcely differ at all in general aspect, and on all sides are connected by intermediate genera: wherefore in the order of Swimming-birds, where the families are generally to be distinguished by well-defined characters, these seem rather to be united into one family. But their form, in this cohort so much and so conspicuously varies, if we try to divide them up, not only facilitates a division into many genera, but almost renders it a necessity."

To emphasise this point, Sundevall calls his groups *a-f* Subfamily as well as generic names, thus, "*Anserinæ* or the genus *Anser*," and indicates the divisions which should be considered as Genera or Subgenera.

In view of recent attempts at the classification of these birds, Sundevall's comments in a few cases may be noted. Thus of *Spatula* he wrote: "With the bill much longer than the head, more widened towards the tip. Otherwise the species are formed and coloured like the true Ducks, from which they are scarcely separable." Of *Cosmonetta* (= *Histrionicus*): "Entirely of the form of the following, (*Clangula*) except for the larger dertrum, the slightly longer tail, which is pointed, and the smoother head. A genus distinct more on account of its colour than its form." These

THE BIRDS OF AUSTRALIA.

two genera have since been admitted by genus-lumpers, though greater differences are observed in the species they have lumped in other cases in the one genus.

In this work I admit two genera which were not accepted in the *Catalogue* of Birds in the British Museum, Vol. XXVII., the latest monographic account of this Order. It is noteworthy that Sundevall practically recognised these, a fact quite unknown to me when I reinstated the genera from a practical examination of the birds themselves: thus Sundevall stated: "*Casarca*! Eyton (*rutila* Pall.) scarcely differs (from *Chenalopex ægyptiaca*). *Radjah*! Rbch. (*A. radjah* Garn. Coqu. t. 49) differs a little in the bill being broader in front, and the nostrils situated near the base." "*Leptotarsis* Gould (*eytoni*) differs in its sharp tail-feathers, which are a little longer (than those of *Dendrocycna*)."

When separating *Aristonetta* and *Nyroca* from *Fuligula*, Sundevall apologised: "We do not consider the divisions propounded to be truly generic."

Such statements clearly show the peculiar modifications existing in the group which prohibit the usage of any well-defined groups unless such be of the most restricted character.

In Baird, Brewer and Ridgway's "Water Birds of North America" (*Mem. Mus. Comp. Zool.* (Harv.), Vol. XII., 1884), this group receives severely scientific handling, and as the result practically monotypic genera are utilised. Careful detailed diagnoses of the genera occurring in the Northern Hemisphere are given, and in every case though the basis is structure, full value is given to coloration. Probably part of this was due to the influence of Stejneger, as this brilliant worker's "Outlines of a Monograph of the *Cygninæ*" was practically utilised without alteration. They write (p. 419): "The species, being very numerous, naturally fall into several more or less well-defined groups, which have been accorded the rank of subfamilies. These, however, grade so insensibly into one another, that it is extremely doubtful whether this rank can be maintained for them," and quote Stejneger's conclusion: "The whole family *Anatidæ* forms, as to structural features, a very homogeneous group, and intermediate links are everywhere to be found."

The minute subdivision prepared by Baird, Brewer and Ridgway has acted as a guide to most workers on this group ever since. Otherwise if it be conceded that all the work has been done independently, then the group could be cited as a champion for the genus splitters. It may be that its difficulty, through the variation in colour and form, has entailed more careful study than some other groups, and the consequent diligent

ANSERIFORMES.

application to the varied forms has converted the workers to the same ideas as the genus-splitters. Whatever the speculation, the notable result is the almost universal admission of restricted genera in this group.

An interpellation of a summary by Stejneger (*Stand. Nat. Hist.*, 1885, p. 136) may precede more serious criticism: "It is needless here to enlarge upon the characters peculiar to the *Anatoideæ* (his name for the Anseriformes of this work) or duck-tribe, in its widest sense. It is one of the best circumscribed superfamilies of recent birds, and its distinguishing characters so well-marked externally, that nobody fails to recognise any member at an instant, be it a swan, a goose, a duck, or a merganser, and most of the systematic names invented for the group, as *Lamellirostres*, etc., have been invented from the soft-skinned bill with the curious lamellar teeth. Most of the species take their food under water, and when the head is raised, the water runs out between the lamellæ, which act like a sieve in retaining the food, which led to the invention of the English word 'sifters,' as an equivalent of *Lamellirostres*. In some forms the lamellæ are shortened and thickened so as to enable them to act as teeth in nipping off grass, as for instance, in the geese, while in the mergansers they are modified into retrorse hooks, which serve to prevent the slimy fish from slipping away."

The latest monograph of the Order is that by Salvadori in the *Catalogue of Birds in the British Museum*, Vol. XXVII., 1895, and this is noteworthy in that though it is the work of a genus-splitter it has been almost universally accepted. It is a pity that no generic diagnoses are given, and it is necessary to study the Keys provided to understand the features Salvadori based his genera upon. It is obvious throughout from a study of these that Salvadori utilised coloration as of great importance, in some cases subordinating differences in structure to similarity of coloration.

Thus for the genus *Ædemia* the "generic" diagnosis given by Salvadori reads: "General plumage of males deep black, of the females greyish-brown, but not barred." This is so framed as the species thus associated show the same general coloration, though the bill shows great variation, much more than is accepted as the basis of generic separation by Salvadori when such alteration is accompanied by colour-change. Then in the case of the "genera" *Nettion* and *Querquedula* no other separative characters are urged than that the former falls into a section with the "Upper wing-coverts not blue, but of a more or less dark grey," while the latter has the "Upper wing-coverts blue or bluish-grey." The structural characters as well as coloration in the typical species of these two genera differ very

THE BIRDS OF AUSTRALIA.

slightly, but in *Nettion* Salvadori included the birds I separate under *Virago*, which to my eyes differ appreciably from either *Nettion* or *Querquedula*. In the American Ornithologist's Union's *Checklist*, 3rd ed., 1910, as a general rule Salvadori's genera are maintained, in some instances subgenera, which Salvadori did not recognise, being introduced, while in others the genera Salvadori admitted have been reduced to subgenera.

Thus in the genus *Oidemia* (which the Americans correctly quote as *Oidemia*) the same association of black Diving Ducks is included, but the structural differences are indicated by the admission of subgenera. Inconsistencies are not however dismissed by these means, as *Nettion* and *Querquedula* are considered generically distinct, though the observed differences in structure are less than in the subgenera of *Oidemia*, while the coloration differs just as little. It is interesting to note that the Americans have reduced *Nyroca* to a subgenus, and by including with it as subgenera only *Aristonetta* and *Fuligula* (under the incorrect name *Marila*) under one genus *Marila* (recte *Nyroca* if the association be admitted) have endorsed Sundevall's dictum quoted above of nearly forty years previously.

Shufeldt (*Emu*, Vol. XII., p. 209 *et seq.*, 1913) adds a subfamily *Dendrocygninae* which could be easily admitted, but does not otherwise alter Salvadori's grouping. I propose to glance at this grouping in connection with a sketch of the forms of Australia. In this group the peculiar evolution of genera seen in the case of the Charadriiformes, but in that Order masked so that study only recognised their aberrant nature, becomes so marked that it is palpable to the superficial observer.

Salvadori, as most other workers, makes the Sub-Order here given ordinal rank co-equal with the family *Anatidae*, but divides that into eleven subfamilies, viz., *Cygninae*, *Anseranatinae*, *Plectropterinae*, *Cereopsinae*, *Anserinae*, *Chenonettinae*, *Anatinae*, *Fuligulinae*, *Erismaturinae*, *Merganettinae* and *Merginae*. Eight of these are represented in Australia, two of them being formed to cover monotypic Australian genera.

The peculiar features of the Australian Anseriform birds will be best appreciated by a review of these subfamilies. The subfamily *Cygninae* consists of very large birds with very long necks and a normal hind toe not bearing a lobe. The coloration of the birds is usually pure white, a South American species having the head and neck black. One Australian bird is referable to this subfamily, and it stands out inasmuch as its coloration is all dark save the white primaries. The genus *Chenopsis* used for it mainly depends upon this extraordinary difference in coloration.

ANSERIFORMES.

The subfamily *Anseranatinae* includes the extraordinary Australian genus *Anseranas* alone; this bird is of large size nearly approaching the *Cygninae*, but has the neck not so long. It has a huge knob on the head and from the base of the culmen to beyond the eyes and the frontal portion of this knob the adult is bare of feathers, giving the bird a rather displeasing appearance. Its legs and feet are, however, more wonderful still, as the former are very long and stout while the toes are long and only half-webbed, and a very long hind toe completes the wonder. Stejneger contrasted it with the majority of Ducks and Geese with Family rank.

The subfamily *Plectropterinae* was formed to include a number of abnormal forms, neither Ducks nor Geese, the Australian representatives being two birds classed in the genus *Cheniscus*. This genus consists of very small birds having the apparent structure of large Geese, but vividly colored, which Geese are not. One of the Australian birds is simply an outlier of an Indian species, but the other is a peculiar species confined to Australia. A remarkable fact is that in the *Catalogue* of Birds in the British Museum another species, *Nettapus auritus* (Boddaert), an African form, is associated with these two, and the three species constitute a remarkable little group called Pygmy Geese, or by the Australians, Goose-Teal. Thus of the three species only one occurs in Africa, only one in Asia, yet two are habitants of Australia.

The subfamily *Cereopsinae* once more individualises the *Anseres* of Australia, as this subfamily only contains the monotypic genus *Cereopsis*, confined to Southern Australia and which closely resembles no other Goose. Shufeldt, who has lately investigated the anatomy of this peculiar Goose, concludes that apart from the characters of the skull it differs little from other Geese, but the skull is so different that subfamily rank must be accorded it. The peculiar cere-bearing bill, and the very strong legs and feet distinguish the form at sight.

The subfamily *Chenonetinae* was introduced to include a number of birds somewhat duck-like in aspect, with a bill formed after the manner of geese. The subfamily seems ill-constituted, the inclusion of the genus *Cyanochen* calling for reconsideration upon geographical grounds alone, while it seems possible that *Chenonetta* would bear divorce from *Chloephaga*. The last-named genus contains six species confined to southern South America and the Falkland Islands, while *Chenonetta* is another of the peculiar isolated Australian Anserine forms. A quick idea of its peculiarities can be formed by the vernacular names under which it is known, viz., Wood-Duck or Maned-Goose. I anticipate that anatomical research

THE BIRDS OF AUSTRALIA.

will enable the fixation of the systematic position of these birds, but I note that Shufeldt, while comparing the anatomy of *Cereopsis novæ-hollandiæ* with that of species of *Chlæophaga*, does not lay much stress upon the relationship of the latter with *Chenonetta*, though he had bones supposed to belong to this genus before him.

The subfamily *Anatinæ* is divided by Salvadori into nineteen genera, of which nine include species of birds attributed to Australia. The first, *Dendrocygna*, covers the Tree-Ducks, which differ from all the rest of the Anatine genera in having the metatarsus reticulated throughout, while the others have a row of scutes in front. They differ superficially in other respects, and Shufeldt, having anatomically examined the species, has separated them into a distinct subfamily, *Dendrocygninæ*. This group has an extraordinary discontinuous distribution, and here again, while one of the species inhabiting Australia (there are two only) is simply a form of an Asiatic species, the other is peculiar to Australia, and is so well characterised that I have admitted it to be generically distinct. These Tree-Ducks are recognisable by their long necks and long legs with the exposed tibia.

Salvadori included the species *Anas radjah* in the genus *Tadorna*, but this bird differs appreciably in form from the monotype of *Tadorna*, and I have admitted Reichenbach's genus *Radjah* for it. This beautiful bird is confined to the Moluccas, Papuan Islands, and Northern Australia, the Australian breeding birds forming a well-marked subspecies. In the genus *Casarca*, proposed for the Ruddy Sheldrake of Europe, the finest Australian Duck is placed, and here, though a variation in coloration is seen from the type, the differences in coloration throughout the genus seem to be gradual, and such as one would anticipate might occur in a natural genus. There is no sudden colour change. In the genus *Anas* occurs the commonest Australian Duck, which very closely agrees with the common European Wild Duck, save that it never puts on a special winter plumage in the case of the male, but that sex is content all the year round with the sombre dress which in Europe is utilised for a short while only in summer, but which the female continuously wears. In structure throughout, the European and Australian birds accurately agree.

In the genus *Nettion* Salvadori placed the *Mareca castanea* of Eyton, for which upon an anatomical peculiarity Newton had introduced the genus *Virago*. The species differs in colour and form from the type of *Nettion* much more than does the genus *Querquedula* which Salvadori admitted, and I have therefore reinstated Newton's genus *Virago*. Two

ANSERIFORMES.

species are here admitted as referable to this genus, but once more, an extraordinary problem in evolution presents itself. Thus, the two species have been confounded by every writer and my own decision with regard to them is open to argument. The commonest species ranges throughout Australia and the islands to the North and East and is considered to be uniform in coloration at all growth stages, seasonal changes and sexual forms. The other has been concluded to differ in that the male takes on a handsome plumage at a certain age and continues this throughout life afterward: this species is confined to Australia, south of the Tropics, and Tasmania. The female of this species was supposed to differ in no way whatever from the male of the preceding.

I have suggested that in the second species both male and female put on the brilliant plumage coloration, but I have not been able to indicate how the immature of this form differs from the mature of the other.

A straggler allotted to the northern genus *Querquedula* has been admitted to the Australian List, but whether it should be included as an Australian bird is a doubtful point. I am dubious and would refuse it recognition without further confirmation.

The genus *Spatula* has a typical representative in Australia, while Gould included the northern bird as a straggler, but his specimen was lost and none have since been procured. The New Zealand Shoveller was recorded by North, but as I consider the New Zealand bird only sub-specifically distinct I also conclude that North's bird was simply a well-marked individual of the Australian race. This genus is characterised by the very long spoon-shaped bill, longer than the head; otherwise, as Sundevall points out, it is a normal Anatine bird.

Another of the extraordinary Australian Anatine birds is represented by the monotypic genus *Malacorhynchus*. The name indicates the peculiar feature. The bill is long and spoon-shaped, as in the preceding, but is in addition provided on the sides with a prominent soft membrane. I consider that this bird has no direct relationship with the genus *Spatula*, and that the similarity in form of the bills in the two genera is due to coincidence, or as it is generally termed, convergence in evolution. A quaint feature in the coloration of the bird is the pink spot behind the eye, whence the vernacular name Pink-eared Duck.

The last member of the subfamily *Anatinae* adds another to the list of Australian Duck wonders, for of the genus *Stictonetta* Salvadori comments: "Systematic position very uncertain." The genus is monotypic and its distribution is southern Australia. In structure it is not closely

THE BIRDS OF AUSTRALIA.

allied to any other genus, while its coloration is remarkable, the vernacular name, Freckled Duck, well describing it.

The subfamily *Fuligulinæ*, or Diving Ducks, is represented by one member only in Australia, a species of the northern genus *Nyroca*, and which is so closely allied that at one time I only considered it subspecifically distinct from the European type of the genus.

The *Erismaturinæ*, a group of specialised Diving Ducks, with a peculiar geographical distribution, are characterised by their narrow and stiff tail feathers. Two peculiar Australian Ducks were included by Salvadori in this subfamily, one of which is closely allied to the typical genus *Oxyura* (= *Erismatura*), but the other, *Biziura*, is an extraordinary form which I suggest anatomical investigation will separate into a distinct subfamily, as its superficial features indicate no clear alliance save in the structure of the tail feathers with the other members of the *Erismaturinæ*. The peculiar lobe under the bill, the diverse sizes of the sexes and the coloration make this form unmistakable, and Eyton's anatomical notes only need confirmation to sanction its absolute divorce from the *Erismaturinæ* while real taxonomic position may be demonstrated. With our present knowledge the evolution of these peculiar Australian *Anatidæ* cannot be traced, though a summary of the family may be acceptable. Twenty-one species and subspecies are here treated of, but two are quite doubtful constituents of the Australian avifauna. In the remaining twenty forms, seventeen genera are recognised, eight of which are endemic and monotypic. Of the other nine genera, four are confined to the near north of Australia, five having representatives in the far north, e.g., Europe.

A complication as to geography may be here noted. Salvadori admitted the subdivision of the Family into eleven subfamilies, eight of which are represented in Australia. Of the three not occurring, members of the New Zealand avifauna are relegated to two, while only one member of the *Fuligulinæ* occurs there as in Australia, but that is referred to a different genus. Yet in New Zealand fossil deposits bones have been commonly found which have been even referred to these endemic Australian genera, in some cases specific distinction being not admitted. There would therefore be good grounds for supposing that these peculiar Australian genera—viz., *Chenopsis*, *Anseranas*, *Cereopsis*, *Chenonetta*, *Stictonetta*, and *Biziura* were of Antarctic origin. In the Introduction of my *List of the Birds of Australia*, p. xxi., 1913, I commented upon this apparent Antarctic element in the Australian avifauna, citing as probable examples the genera *Tribonyx* and *Cereopsis*. The

ANSERIFORMES.

reviewer in the *Ibis* 1914, pp. 147-149, noticed this and wrote: "In another section of the Introduction the zoogeographical relations of Australian birds are discussed. Mr. Mathews draws attention to what he believes to be an Antarctic element in the avifauna, and instances such genera as *Tribonyx* and *Cereopsis* as having an Antarctic origin. To prove this, however, it is necessary to postulate considerable changes in the distribution of land and water, and great alterations of climate in tertiary times, and at present there seems to be hardly enough evidence of this. There seems to be no reason to reject the hypothesis that the Australian avifauna originally reached the continent from the north, but at so long a period ago that it has become profoundly modified."

I would simply note that the hypothesis that the Australian *Fauna*, considered as a whole, originally reached the continent from the north has been rejected by nearly every recent worker in other branches of science as being quite unable to explain the connections of the South American, New Zealand, and Australian genera and species. Our knowledge of Australian avian anatomy is so imperfect that we cannot yet prove exact relationships, but all the available evidence points to *Antarctica* as a stepping-stone between the three above-named places, though probably not a centre of evolution, a result arrived at by other investigators in other branches. This is just a note by the way, as I hope to make further contributions to the subject when I will simply work to the facts, as I am quite unprejudiced with regard to either theory. I have stated that though the Australian *Charadriiformes* show a marked endemic element, in every case I should at present consider the birds to have had a northern origin. In the case of the Australian *Anseriformes* I do not consider such a statement can be made, and therefore some other solution of the endemism must be sought.

GENUS—CHENOPIS.

CHENOPIS Wagler, Isis 1832, p. 1234 Type *C. atrata*.

Also spelt—

Chenopsis Reichenbach, Nat. Syst. Vögel., p. x., 1852.

CYGNINE birds of dark coloration with medium bill, very long neck, long wings, very short tail, short legs, and long toes fully webbed. The bill is longer than the head and about three-fourths the length of the metatarsus; it is of medium height at the base, swollen at this place but rapidly becoming depressed towards the tip, which overhangs the under mandible; nail not prominent. Obsolete lamellæ can be noted only along the central portion of the sides of the upper mandible, being altogether lacking towards the base and the tip. Nostrils small ovals, somewhat diagonally placed near base of bill but high up on sides of upper mandible. Under mandible broad and flat; strong serrations on each edge corresponding with the obsolete lamellæ of upper mandible. Rami broad and flattened, enclosing a long narrow unfeathered groove which extends almost entire length of lower mandible, only a small flattened ungrooved tip being present.

The wings are long, the second primary longest. The tail, composed of twenty-two feathers, is square and is less than one-fourth the length of the wing and little more than the metatarsal length. The metatarsus is short, stout and covered throughout with very small reticulate scales. The toes are long, exceeding the metatarsus in length and fully webbed; a short hind toe is present, which is not lobed.

This genus, which is commonly recognised, depends to a great extent upon coloration. In the *Catalogue* of Birds in the British Museum, Vol. XXVII., 1895, Count Salvadori gives (p. 24) as the differential characters of the genus: "Tertials and scapulars crisp; predominant colour black."

The latest review of the swans I have noted is that by Oberholser in the *Emu*, Vol. VIII., pp. 1-11, 1908. There the genus *Chenopsis* is maintained, but the addition of "Tail shorter than middle toe with claw" is made to Salvadori's diagnosis.

The genus is monotypic as now existing and confined to Australia, where it becomes very uncommon towards the extreme north. Fossil

CHENOPIS.

bones have however been discovered in the neighbourhood of Lake Eyre which have been referred to this genus, but have been regarded as constituting a different smaller species.

Further bones have been met with as fossils in New Zealand and the Chatham Islands, which have also been considered as belonging to the present genus, and moreover are differentiated as being specifically separable by their slightly larger size, but otherwise very similar. It is suggested that the New Zealand birds might have differed in coloration.

CHENOPIA ATRATA.

BLACK SWAN.

(PLATE 200.)

ANAS ATRATA Latham, Index Ornith., Vol. II., p. 834, 1790 ; New South Wales.

Black Swan (Lister), Philos. Trans. Lond., Vol. XX., p. 361, 1698 ; Phillip, Voy. Botany Bay, p. 98, 1789 ; Vancouver, Voy. Disc. North Pacific Ocean, Vol. I., pp. 38, 52, 1798 ; Labillardière, Voy. in Search of La Pérouse, Engl. ed., Vol. I., p. 173, pl. ix., 1800 ; Latham, Gen. Synops. Suppl., Vol. II., p. 343, 1801 ; *id.*, Gen. History Birds, Vol. X., p. 224, 1824.

Anas atrata Latham, Index Ornith., Vol. II., p. 834, 1790 ; Ranzani, Elem. di Zool., Vol. III., pt. ix., p. 97, 1826 ; Yarrell, Trans. Linn. Soc. (Lond.), Vol. XV., p. 382, pl. xii. (trachea), 1827.

Anser novæhollandiæ Bonnaterre, Tabl. Encyc. Méth. Ornith., Vol. I., p. 108, 1791 (New South Wales).

Anas plutonia Shaw and Nodder, Naturalists' Miscellany, Vol. III., pl. 108, 1792 (New South Wales) ; Lesson, Voy. Coquille, Vol. I., p. 400, 1826.

Cygnus atratus Vieillot, Nouv. Dict. d'Hist. Nat., Vol. IX., p. 39, 1817 ; Dumont, Dict. Sci. Nat. (Levrault), Vol. XII., p. 314, 1818 ; Stephens in Shaw's Gen. Zool., Vol. XII., pt. ii., p. 18, pl. 39, 1824 ; Vieillot, Galerie d'Oiseaux, Vol. II., p. 215, pl. 286, 1825 ; Yarrell, Zool. Journ., Vol. IV., p. 321, 1828 ; Lesson, Manuel d'Orn., Vol. II., p. 407, 1828 ; *id.*, Traité d'Orn., p. 629, pl. 48, fig. 1, 1831 ; Bennett, Gardens and Menag. Zool. Soc. Birds, p. 45, cum. fig., 1831 ; Heron, Proc. Zool. Soc. (Lond.), 1835, p. 107 ; Lesson, Compl. de Buffon, Ois., Vol. IX., p. 529, 1837 ; Lesson, Revue Zool., 1839, p. 323 ; Ruppell, Mus. Senckenb., Vol. III., p. 9, 1839 ; Gray, Genera Birds, Vol. III., p. 610, 1844 ; Hartlaub, Syst. Verz. Ges. Mus., p. 118, 1844 ; Gould, Birds Austr., Vol. VII., pl. 6, 1845 ; Stokes, Discov. in Austr., Vol. I., p. 482, 1846 ; Sturt, Narr. Exped. Centr. Austr., Vol. II., App., p. 55, 1849 ; Reichenbach, Synops. Av. Natatores, pl. 105, figs. 251-252 ; pl. 107, fig. 2362, 1850 ; Lichtenstein, Nomencl. Av. Mus. Zool. Berol., p. 101, 1854 ; Selater, Proc. Zool. Soc. (Lond.), 1859, p. 206 ; Crisp, *ib.*, p. 258, 1860 ; *id.*, *ib.*, 1862, p. 142 ; Bennett, Gath. Nat. Austral., p. 238, 1860 ; Schlegel, Mus. Pays-Bas, Anseres, Vol. VI., p. 80, 1866 ; Müller, Proc. Zool. Soc. (Lond.), 1869, p. 280 ; Selater, *ib.*, p. 629 ; Gray, Handl. Gen. Sp. Birds, pt. iii., p. 78, 1871 ; Giebel, Thes. Ornith., Vol. I., p. 855, 1872 ; Pelzeln, Ibis 1873, p. 46 ; Garrod, Proc. Zool. Soc. (Lond.), 1875, p. 348 ; Gulliver, *ib.*, p. 488 ;



J.G. Keulemans, del.

Witherby & Co.

$\frac{1}{4}$
CHENOPIA ATRATA.
(*BLACK SWAN*).

BLACK SWAN.

Ramsay, Proc. Linn. Soc. N.S.W., Vol. I., p. 194, 1877; Selater, Proc. Zool. Soc. (Lond.), 1880, p. 507; Forbes, *id.*, 1882, p. 352; Reichenow, Ornith. Centralbl., 1882, p. 39; *id.*, Vögel. Zool. Gart., p. 70, 1882; Legge, Papers Proc. Roy. Soc. Tasm., 1886, p. 244, 1887; *id.*, *ib.*, 1887, p. 96, 1888; Ramsay, Tab. List Austr. Birds, p. 22, 1888; Evans, Ibis 1891, p. 71; Hartert, Kat. Vögels Mus. Senckenb., p. 226, 1891.

Anas cygnus niger Perry, Arcana, March 1, 1811 (New South Wales).

Chenopsis atrata Wagler, Isis 1832, p. 1234; Gray, List Birds Brit. Mus., pt. III. (Anseres), p. 131, 1844; Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 648, 1856; Gould, Handb. Birds Austr., Vol. II., p. 346, 1865; Ramsay, Ibis 1866, p. 335; *id.*, Proc. Zool. Soc. (Lond.) 1877, p. 345; Stejneger, Proc. U.S. Nat. Mus., Vol. V., p. 219, 1882; Salvadori, Cat. Birds Brit. Mus., Vol. XXVII., p. 41, 1895; Hall, Key Birds Austr., p. 105, 1899; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 1014, 1901; Hill, Emu, Vol. II., p. 166, 1903; Carter, *ib.*, Vol. III., p. 211, 1904; Legge, *ib.*, Vol. IV., p. 107, 1905; Lawson, *ib.*, p. 137, 1905; Cleland, *ib.*, Vol. V., p. 206, 1906; Hall, Key Birds Austr., 2nd ed., p. 105, 1906; Berney, Emu, Vol. VI., p. 156, 1907; Batey, *ib.*, Vol. VII., p. 17, 1907; Hill, *ib.*, p. 23, 1907; Austin, *ib.*, p. 78; Tait, *ib.*, p. 87, 1907; Mattingley, Vict. Nat., Vol. XXV., p. 63, 1908; Oberholser, Emu, Vol. VIII., p. 9, 1908; Hall, *ib.*, Vol. IX., p. 132, 1910; Mathews, Nov. Zool., Vol. XVIII., p. 235, 1912; Stone, Emu, Vol. XII., p. 121, 1912; Chandler, *ib.*, Vol. XIII., p. 35, 1913; Orton and Sandland, Emu, Vol. XIII., p. 76, 1913; Mathews, List Birds Austr., p. 86, 1913; North, Aust. Mus. Spec. Cat., no. 1, Vol. IV., p. 52, 1913; Sharpe, Hist. Coll. Nat. Hist. Brit. Mus., Vol. II., p. 152, 1906; Mathews, Handl. Birds Austral., p. 34, 1908; Whitlock, Emu, Vol. IX., p. 190, 1910; Howe, *ib.*, p. 229, 1910; Littler, Handb. Birds Tasm., p. 212, 1910; Mellor and White, Emu, Vol. XII., p. 161, 1913; White, *ib.*, p. 183, 1913; *id.*, *ib.*, Vol. XIII., p. 124, 1914; Macgillivray, *id.*, p. 146.

Cygnus plutonius Badeker, Die Eier eur Vögel., pl. 31, fig. 2, 1863; Nathusius, Journ. für Orn., 1871, p. 253; *id.*, *ib.*, 1879, p. 246.

Chenopsis atrata Reichenbach, Nat. Syst. Vögel., p. x., 1852; Sundevall, Meth. Nat. Av. Disp. Tent., p. 146, 1872.

Chenopsis atrata roberti Mathews, Nov. Zool., Vol. XVIII., p. 446, 1912; Augusta, South-west Australia.

DISTRIBUTION. Australia; Tasmania; rare in the extreme north of Australia.

Adult male. Entire plumage above and below black, somewhat paler and inclining to sooty-black on the under-surface, with pale margins to the feathers giving a scalloped appearance on the back; a portion of the bastard-wing and some of the upper greater wing-coverts white; primary-coverts also white at the base and black towards the tips, more especially on the inner webs; primary-quills white, irregularly marked with brown near the tips; secondaries also white except the innermost, which are black like the back. Bill strawberry-red; nail and bar flesh-white; iris dull red; feet pale yellowish flesh-colour, webs pale grey. Total length 915 mm.; culmen 72, wing 466, tail 100, tarsus 97.

Adult female. Similar to the adult male.

THE BIRDS OF AUSTRALIA.

Immature birds appear to have more black on the primary- and secondary-quills.

Nestling. Covered with dark greyish down.

Nest. A large open structure composed of reeds and rushes placed near water, lined with roots and finer materials, either on the edge, or in a swampy place. Outside measurements about four feet across, and from twelve to twenty-four inches high. Depression, twelve inches by three.

Eggs. Four to eight. Of a uniform pale green (duck-egg) colour, slightly rough on the surface. Axis 104 to 110 mm., diameter 64 to 69. Average weight: when full about nine ounces (Campbell).

Incubation-period. 35 days (Sclater).

Breeding-period. August to January (Campbell); June and July (Mathews).

THIS bird was first given a Latin name by Latham (Index Ornith., Vol. II., p. 834, 1790), who gave the name *Anas atrata* to the description given by Phillip in his *Voyage to Botany Bay*, on p. 98, published in 1789. Phillip wrote: "On this lake (near Port Jackson, New South Wales) they first observed a Black Swan, which species, though proverbially rare in other parts of the world, is here by no means uncommon, being found on most of the lakes. This was a very noble bird, larger than the common swan, and equally beautiful in form. On being shot at, it rose and I discovered that its wings were edged with white: the bill was tinged with red."

It, however, had been discovered almost one hundred years earlier, the first note I have been able to trace being the one in the *Philosophical Transactions of London*, Vol. XX., p. 361, 1698, quoted but not acknowledged by Gould. All that there appears is as given by Gould, viz.: "Here is returned a ship, which by our East India Company was sent to the South Land, Hollandia Nova. . . . Black Swans, Parrots, and many Sea-Cows were found there. . . ." This occurs in a "letter from Mr. Witsen, Burgermaster of Amsterdam and F.R.S. to Dr. Martin Lister, Fellow of the College of Physicians and R.S." The above refers to Vlaming's Voyage.

In "Journaal . . . Voyagie . . . Zuid-Land . . . published in Amsterdam 1701" (which is a record of the voyage of Willem de Vlaming in 1696-7) on p. 15 under the date 7th January, 1697, is written: "On the 7th the whole crew returned on board with the boats, bringing with them two black swans. The mouth of the said River [Swan] lies in 31 degrees 46 minutes."

Again on p. 16: "On the 11th, at break of day we again ascended the river, and saw many swans (our boat knocked over nine or ten)," (translation). Three were carried to Batavia alive but died soon after their arrival.

BLACK SWAN.

It would seem that Willem de Vlaming's ship was the one indicated in Witsen's letter, and that the date 1695 should be 1698 as Gould suggested.

Such a large, attractive and edible bird would compel an extensive literature, and I would simply note a couple of the earlier notes not commonly accessible. Thus Vancouver, in his *Voy. Disc. North Pacific Ocean*, Vol. I., 1798, has written, p. 38: "Oct. 7, 1791. King George's Sound, West Australia. Our attention was directed to several large Black Swans in very stately attitudes swimming on the water, and, when flying, discovering the under-parts of their wings and breast to be white: this is all the description we were enabled to give of them, since they were excessively shy, and we very indifferent marksmen. . . . On its (a rivulet) banks were many Black Swans. . . . (p. 52). Of the waterfowl, the Black Swan seemed as numerous as any other species of aquatic birds in the neighbourhood of Oyster Harbour (King George's Sound), but they were seen in no other place."

In Labillardière's account of the *Voyage in Search of La Perouse*, Eng. ed., p. 173, 1800, we find that in April, 1792, they met with at D'Entrecasteaux Port: "A bird that was shot upon one of the lakes surprised us very much by the singularity of its plumage. It was a new species of the swan, of the same beautiful form, but rather larger than ours. Its colour was a shining black, as striking in its appearance as the clear white of ours. In each of its wings it had six large white feathers; a character which I have uniformly remarked in several others that were afterwards killed. The upper mandible was of a red colour, with a transverse white streak near the extremity. The male had at the base of it an excrescence consisting of two protuberances, that were scarcely observable in the female. The lower mandible is red at the edges and white in the middle. The feet are of a dark grey (see Plate ix.)."

Numerous notes regarding these birds occur throughout Flinders' Voyage, and some of the more interesting may be here quoted. Thus, in the Introduction, p. clvi., under date Nov. 10, 1798, with regard to Flinders and Bass's expedition to Bass Straits is written: "On the east, or lee side of this point and shoal was a flock of swans, in number not less than from three to five hundred; and their cast quills were so intermixed with the sand as to form a component part of the beach. This countless number of quills gave me an insight into the cause why so many of the swans, though not young birds, were unable to fly; they moult their wing feathers, probably at stated periods, though not, I should think, every year. This sandy projection was named *Swan Point*. On steering southward from thence, I found that the bight in which this great

THE BIRDS OF AUSTRALIA.

number of birds had assembled was full of shoals producing the long aquatic grass which forms the principal part, if it be not their sole food. We sailed through the flock, and might have procured a good number had not the progress of the sloop obliged us to hasten onward to *Shoal Point*; one incautious bird was caught by his long neck as we sailed past him. Later (p. clxiv. and v.) we found Port Dalrymple to be an excellent place for refreshment. Out of the flocks of Black Swans, from one-fifth to one-tenth of them were unable to fly: and since the same thing has been found to obtain in the months of January and May, as well as in October, it is probably so at all times of the year. These birds are endowed with a considerable portion of sagacity: they cannot dive, but have a method of immersing themselves so deep in the water as to render their bodies nearly invisible, and thus frequently to avoid detection. In chase, their plan was to gain the wind upon our little boat; and they usually succeeded when the breeze was strong, and sometimes escaped from our shot also."

Previously (p. cliii.) there is a quaint note: "Mr. Bass went off in the boat to look up it (a river mouth). His attention was, however, soon called to another pursuit—a number of Black Swans were swimming before him, and judging from former experience in Western Port, that several of them were unable to fly, he gave chase with the boat. On his return at dusk, he rejoiced us with the sight of four, and with a promise that we should not be in want of fresh provisions in this port." Page cliv.: "Our fresh provisions were still further increased by an addition of six swans, caught this evening with the boat." On p. cxix.: "It should be remembered that Mr. Bass sailed with only six weeks' provisions; but with the assistance of occasional supplies of petrels, fish, seal's flesh, and a few geese and Black Swans, and by abstinence, he had been enabled to prolong his voyage beyond *eleven* weeks."

Such comments commonly repeated show that this bird was of great service to the early intrepid investigators as an article of food, though present-day explorers would scarcely relish them.

Captain S. A. White has given me the following note: "These birds are numerous still in places, and since we were the means of totally protecting them for several years past they have increased wonderfully. They seem to frequent salt lagoons, lakes, and mouths of rivers as much if not more than fresh water; they certainly like the reeds and rushes of fresh water lakes to nest in. They construct a large nest of rushes, reeds, and flags far above the water, and line it with the down from their bellies and lay from 4 to 8 eggs, though I have taken 10 eggs.

BLACK SWAN.

Both birds assist in incubation, and in South Australia they lay in June and July.

"They travel by night, as a rule in a long line sometimes over a mile in extent and seem to have a recognised leader: they give a harsh note at intervals which can be heard some distance in the clear night air."

The following interesting comment on the increase of this bird has been contributed by Mr. Frank S. Smith: "The late Professor Newton had the idea that the swan was rapidly becoming extinct. I wrote to him and told him that, if he came out here, I would soon (in a day's drive from my own home) tire him out counting swans. As a matter of fact (as I suppose you know) they are very plentiful still, and in no danger at all of becoming extinct. Scarcely any of our numerous Western District Lakes but has its quota; and I have seen hundreds on some lakes: on one lake, in fact, and that a small one, I must have seen a thousand. It was a fine sight. Even on lakes in the heart of settlement there are usually a few swans, but, as you get away from settlement, they increase rapidly. I mention this, as Newton's *Dictionary of Birds*, which says the contrary, is a standard work. I have made inquiries regarding swans in the north-western areas of this State, and over the Murray and everywhere the report is the same—plenty of swans. They are seldom molested nowadays, except by the Cockney variety of sportsman; and, as they breed freely, they have no trouble in keeping their numbers up. Also, a few of us are getting various suitable spots throughout the State proclaimed 'sanctuaries,' with a close season all the year. We have nearly a dozen already, and these places will be a big help not only to the swans, but to the ducks and other waterfowl. One sanctuary, a swamp near Streatham, is known as 'The Home of the Swan,' and on its 500 acres of reed-beds swans breed by the hundred."

Mr. Tom Carter, writing from West Australia, reports: "Fairly plentiful throughout the State. Occurs in great numbers in the North-west in wet years, the breeding-season coinciding with the rains. On the Lake, at the Minilya River, I have seen 300 or more birds at one time, and they bred there whenever there was a full lake: also on the Nicol Bay Flat, south of the Gascoyne River, and on large cane grass clay flats inland from Point Cloates when these flats were covered with water. I have known the swans to build numbers of nests and lay their eggs, but be obliged to abandon them owing to the water drying up before the young were hatched. At Lake Muir, in the south-west of this State, I observed nearly forty nests in December, 1911, built on a sandbank about twelve yards in from the then edge of water. Each nest contained from three

THE BIRDS OF AUSTRALIA.

to five abandoned eggs, one nest only containing seven eggs. There were skeletons of two dead swans at the nests and many eggs scattered on the shore adjacent. Upon enquiring from Mr. Muir what was the cause of this sad state of affairs, he told me that the lake had been dry for some years, but filled again (salt water) in 1910, and the swans built their nests and laid the eggs about October, but a heavy storm came on and the water washed over the nests causing them to be abandoned. In the record wet year of 1900, in the North-west, odd pairs of swans bred at many small water-holes. I saw a nest containing seven eggs on an islet covered with samphire bush on a flooded saltmarsh at Maud's Landing, on May 1, and eggs were observed in various seasons at dates between May 1 and July 12."

Mr. H. E. Dove has forwarded me an item concerning these birds as "weather prophets" which must incite interest: "On December 20th, 1908, a pleasant day with breeze from the north, not at all unpleasantly warm, the Black Swans (*Chenopsis atrata*) were going through extraordinary evolutions in the lakes at Essendon, Victoria, turning on their backs so as to immerse the head, neck and upper-part of body, while in this position kicking both legs in the air, then righting themselves only to repeat the movement. This went on for half-an-hour or so, at the same time the Black Duck (*Anas superciliosa*) were chasing each other on the wing round and round the lake. The friend who was with me, a man of keen observation who has spent nearly all his life in various parts of Victoria, said, 'We shall have some bad weather after this.' Next morning, 21st December, we had a heavy blow from N.W. with a dust-storm like a thick fog; the wind raised a high sea on Port Phillip, overturned all the tents at Altona Bay, and capsized two wagon-loads of crockery which had gone out for the use of the campers; damage was sustained by buildings and shipping. This violent wind lasted until 11 a.m., when a shift occurred to the S.W., with coolness and cessation of the thick dust. Afterwards rain set in and lasted most of the afternoon, with wind from N.W. backing to N.E. On 24th December, the Black Swans were again behaving in the same eccentric manner on the lake, the wind being S.W. light and the temperature agreeable; the evening, however, was squally and cold; next day, 25th, high, cold wind all day, and morning of 26th colder still, wind S. and heavy showers. The afternoon was clear, the night very cold, more like July than December in these latitudes. So the predictions of the waterfowl were amply fulfilled in both cases."

BLACK SWAN.

Mr. J. W. Mellor has sent me the following account: "I have seen this bird throughout Australia. On the Coorong, in South Australia, I have seen them in thousands until the water was perfectly black, and their long necks presented a peculiar effect as they stood up above the water, like so many black sticks or stalks of water-plants, with a red flower on top, represented by the bill. This was in 1872, but since then the Black Swan has been sadly molested by the advance of civilization, both young and old birds being ruthlessly shot by so-called sportsmen, whom I have heard boast that they 'potted' twenty and thirty Black Swan in an evening as they came along the water to feed. The half-caste natives (nearly white) have been great enemies in these districts, including lakes Alexandrina and Albert, as they rob the nests shamefully under cover of the clause in the Bird Protection Act, which gives the aboriginal a 'free hand' to take for his personal consumption. I have heard these so-called blacks boast of having taken 200, 400, 600, and 800 eggs each during a single raid in the swamps during the nesting time. The *modus operandi* resorted to by the blacks to secure the old birds is to conceal themselves just before dusk where a neck of land juts out and forms a low bank in the water: the unwary swans will fly low over the water until they reach the jutting land, then swoop up over it, and as they do so the black in ambush fires his gun right into the bird's breast, and down one or two come, according to the number of barrels to the gun, for the range is too close to miss the bird, and the blacks, though armed with old guns, are the best of shots, and can stalk their game better than white men and have great patience in doing so. These practices ran the supplies very low, and a year or two ago the swan was totally protected in South Australia, and they are now increasing steadily. The clutch of eggs being 6 to 8, the increase is considerable, providing they have half a chance from molestation. The nest is placed on the flags and reeds and composed of pieces of these, or anything movable within the reach of the swan's long neck, as the birds will sit on the structure and stretch out and gather in the material very fast, until quite a bulky pile is made, measuring 4 or 5 feet across, and several feet high; the nest is buoyant with the air-cells of the flags and reeds, and as the water rises, should it reach the pile, it will rise on the surface of the water and sometimes break away from its moorings and float some distance in the swamp weed and plants, the parent bird keeping to her duties quite unconcerned. The birds are very savage in their endeavours to protect their young in captivity or semi-captivity, but in their wild state they leave the nest quietly at the approach of danger,

THE BIRDS OF AUSTRALIA.

and when the young are with them they will lead them in the water, and try to take them out of harm's way. The note is a peculiar trumpeting sound, especially that of the male, which is generally made with outstretched neck; there is also a squeaking note, made in a plaintive manner while the birds are flying, and so well-known by sportsmen at night as the birds are flying from place to place in mid-air. On the Swan River, West Australia, these birds were completely exterminated some years ago, but by introducing some they are now reinstated in their old quarters and are multiplying."

Later Mr. Mellor wrote: "The large numbers of these birds about the waters and on the various islands show that the total protection afforded them recently in this state has greatly assisted in their increase, but there still remains much to be done for their welfare, and a movement is now on foot to prevent the blacks and half-castes from taking their eggs and shooting the birds, as the blacks take hundreds of their eggs at a single raid round lakes Alexandrina and Albert, and so nullify the protection given them by white men. Very few, comparatively speaking, were nesting, and we did not come across more than twenty or thirty nests with eggs, but hundreds of old nests were seen, giving evidence of the raids of the egg-hunters. On one well-grassed island the presence of the 'shaghead' hunters of a couple of years ago was strikingly evident, as they had camped on the island to cut off the heads of the young shags and so driven away the swans; scores of nests with the rotten eggs were there, so thick and with the grass growing over them that at every stride or two you would tread on a nest, and the eggs would explode with a loud noise. The nests were built on the open ground where a few low bushes grew, but generally speaking they do not select spots where the vision is closed in, liking to see all round them so as to be off when danger threatens. The birds have a great job to rise in the air with their heavy bodies, and some 30 or 40 yards are needed to get a complete rise; the bird, with outstretched neck and head bent slightly down to assist in getting the balance, flaps along the water a short distance, beating the air and the water vigorously and working its feet all the time, and even when just above the water will continue to tread on the surface of the water for a long distance, and eventually drawing up its feet and legs into its belly, sails away with outstretched neck."

Captain W. E. Leggatt has given a nice report of this bird in Tasmania (Littler, *Handb. Birds Tasm.*, p. 214, 1910): "During the day the Black Swan keeps to the salt water, and feeds over the sandy mud-flats

BLACK SWAN.

which are covered by the tide. It is timid, and approaches no nearer the shore than the depth of water allows, swimming in as the tide flows and retreating with the ebb, keeping always in such a position that it can comfortably reach the bottom with its bill. At the least strange sound it raises its head above water and looks about, and if all is not quiet moves out from the shore. It is very sensitive with regard to hearing, and it is almost impossible to approach within a couple of hundred yards of it if you are to windward, so that it is always necessary to keep to leeward if you wish to approach close, and then great care must be taken that you do not expose yourself in any way. Black Swans generally keep together in large flocks; it is seldom that one sees a couple at any distance from hundreds of others. If the tide, when receding, leaves large banks uncovered, the swans, after having obtained sufficient food, generally bask in the sun on these banks and go to sleep. Towards evening they make a move towards the river mouths and creeks, and stay in there all night. . . . The Black Swan does not like rough water, and always moves as the wind changes so that it may feed peacefully under the lee of some bank or point. . . They are, as a rule, easily killed, a single grain of large shot in the head or neck being quite sufficient to cause death. The above remarks apply to the north-west Coast, to which portion of Tasmania my experience with this bird has been confined."

Cleland in the *Emu*, Vol. V., p. 206, 1906, gives the following note on the mechanical advantages of the shape of swans for feeding: "While watching recently some swans—two of the domestic White and one Black (*Chenopsis atrata*)—the perfect adaptation of their shape to the method of feeding was strikingly manifest. In shallowish water they will be frequently noticed while thus engaged with the tail projecting vertically and with head and neck stretched downwards to seek the weeds growing on the bottom. It will be seen that this movement from the horizontal is executed with wonderful ease, the whole body swinging round a transverse axis at about the level of the legs and through the centre of gravity. The bases of two cones then meet at this level—one, whose apex is the head, pointing while thus feeding directly downwards, and the other a shorter and more compact cone, whose summit is the tail, looking upwards and keeping the bird with ease in its apparently awkward position. Then, when the swan wishes to advance a little, two or three paddles with its webbed feet sends it on the requisite distance. To assume again the erect position, the lower cone is shortened and tilted forwards by raising and bending the neck,

THE BIRDS OF AUSTRALIA.

with the result that the upper one falls backwards and the bird floats on the surface of the water."

Gould* in 1865 wrote: "Our celebrated countryman and navigator Cook observed it on several parts of the coast, and from that time to the present it has attracted the attention of every traveller in Australia, and been noticed by most authors who have written upon its natural productions; still, all that has hitherto been placed upon record has been mere notices of its existence, unaccompanied by any information respecting its habits and economy . . . and my account will fall far short of what the historian of so noble a bird ought to be able to give, for our knowledge of it is still very limited."

Almost fifty years afterward I feel I should endorse this paragraph as, though certainly many notes have appeared in that interval, the economy of the bird is still obscure. Much has been written about its occurrence and breeding dates, but little else of value has been added. The observations here given seem to cover most of the known data regarding the Black Swan, and it will be patent that much has yet to be done. It is quite probable that it is due to the large size and familiarity with the bird that no one has taken the trouble to record the life history of the bird. British ornithologists have taken to illustrating the "home life" of their native birds with pen and camera. What an interesting subject such a magnificent bird would make to an Australian ornithologist, while the comparative ease with which such studies could be effected invites immediate attention.

Australian ornithologists have produced with their cameras some of the most beautiful bird pictures yet taken. Will not some one give this bird its due and give us some glorious photos of this swan from nature?

I recently differentiated the bird inhabiting the western portion of Australia, but in this place I have not upheld the subspecies, though I still think that the examination of longer series of specimens would compel its reinstatement.

The bird figured and described was collected at Augusta, West Australia, in 1897.

* *Handb. Birds Austr.*, Vol. II., p. 347.

GENUS—ANSERANAS.

ANSERANAS Lesson, Manuel d'Orn., Vol. II., p. 418,

1828 Type *A. semipalmata*.

Also spelt—

Anseranus Gray, List. Genera Birds, 1840, p. 72.

Choristopus Eyton, Monogr. Anatidæ, p. 8, 1838 .. Type *A. semipalmata*.

ANSERIFORM birds with very long bills, naked fore-head, conical apex to skull, head short, neck of medium length, long wings, medium tail, long stout legs, and long toes *half-webbed*.

The bill is very long and fairly deep at base: the fore-head from behind the eyes is bare of feathers, and a conical ridge is developed on the top of the head which distinguishes this bird at sight. The nostrils are very small, situated about midway between base of culmen and tip; placed high up and very close together on each side of obscurely marked culmen ridge. Obsolete lamellæ are visible inside edges of upper mandible. The nail is very hard, and strongly marked off from rest of culmen, and overhangs the lower mandible in a sharp point. In the lower mandible the portion corresponding to the nail is similarly defined and of the same constitution, but somewhat convex. The rami, widely separated and parallel, enclose an unfeathered groove. On their edges obsolete lamellæ may be observed. The culmen is longer than the head.

The wing is long, with the first primary short and about equal to the seventh; the second to fifth are of about the same length, the sixth slightly shorter.

The tail, composed of twelve feathers, is square and is more than one-third the length of the wing.

The legs are very long and stout, a portion of the tibia being exposed; the metatarsus is covered with small reticulate scales and is more than half the length of the tail.

The toes are very long with the webs between extending only half their length, the middle toe without the claw being about half the length of the tail and not much shorter than the metatarsus; the hind toe is not lobed and is very long and placed on the level of the anterior toes; it is almost half the length of the middle toe.

The claws are long.

THE BIRDS OF AUSTRALIA.

This extraordinary generic form was placed in a separate subfamily by Count Salvadori in the *Catalogue* of Birds in the British Museum, Vol. XXVII. The peculiarly formed head is equalled in interest by the half-webbed feet with the long hind toe.

Stejneger, probably in the very forefront of systematic ornithologists of the latter end of the nineteenth century, wrote of it as follows (*Stand. Nat. Hist. Birds*, Vol. IV., p. 138, 1885): "Australia is the habitat of another not less remarkable goose-like bird, the peculiarities of which seem to us too great to allow it to be kept in the other families, and hence we would make it the type of the *Anseranatidæ*. It has usually been referred to the following group, to which it, perhaps, may also be nearest allied, but who would recognise the foot represented in the cut as that of a goose? The long front toes, only united at base by a small membrane and armed with long and sharp claws, and especially the remarkably lengthened and strong hind toe, which is inserted nearly at the same level as the others, are characters so unique among Anseres that a separate position can hardly be denied the owner, and the feet, indeed, strongly suggest those of the screamers. The bill is also very peculiar, a warty skin covering the beak from the nail and the face to behind the eyes. The convolutions and position of the windpipe are most extraordinary and deserve to be mentioned."

Stejneger then quoted Yarrell's* account of this, which may be here again reproduced: "The trachea is situated on the outside of the left pectoral muscle, under the skin . . . sufficiently raised under the wing that respiration would not be impeded when the bird rested with its breast on the ground; the parallel tubes being firmly attached both to the muscle and the skin by cellular tissue. . . . The clavicle of the right side of the bird is of the usual character, but that on the left is both shorter and wider, having an aperture about the middle, the sides diverging with a projecting point on the inner side, to which the tube of the trachea is firmly attached, about two inches above the bone of divarication. The trachea lying on the left side of the bird, the lower portion of the tube, in its passage to the lung, crosses the left branch of the furcula at a right angle, but, becoming attached to this projection of the clavicle, receives from the point described its central direction into the body. The whole length of the windpipe is four feet eight inches."

* *Trans. Linn. Soc. (Lond.)*, Vol. XV., p. 383, 1827.



H Goodchild. del

Witherby & Co.

$\frac{2}{7}$

ANSERANAS SEMIPALMATA.
(PIED GOOSE).

ANSERANAS SEMIPALMATA.

PIED GOOSE.

(PLATE 201.)

ANAS SEMIPALMATA Latham, Trans. Linn. Soc. (Lond.), Vol. IV., p. 103, 1798 ; Hawkesbury River, New South Wales.

Anas semipalmata Latham, Trans. Linn. Soc. (Lond.), Vol. IV., p. 103, 1798 ; *id.*, Index Ornith. Suppl., p. lxix., 1801 ; Yarrell, Trans. Linn. Soc. (Lond.), Vol. XV., pt. II., p. 383, pls. xiii., xiv. (trachea), 1827.

Black and White Goose, Latham, Gen. Synops. Birds, Suppl., II., p. 344, 1801.

Semipalmated Goose, *id.*, *ib.*, p. 347, pl. 139, 1801 ; *id.*, Gen. Hist. Birds, Vol. X., p. 295, pl. 178, 1824.

Anas melanoleuca Latham, Index Ornith. Suppl., p. lxix., 1801 ; Cuvier, Mem. Mus. Hist. Nat. (Paris), Vol. XI., p. 345, pl. 19, 1827 ; Lesson, Compl. de Buff. Ois., Vol. IX., p. 531, pl. 49, fig. 1, 1837.

Anser semipalmatus Vieillot, Nouv. Dict. d'Hist. Nat., Vol. XXIII., p. 343, 1818 ; *id.*, Tabl. Ency. Meth. Orn., Vol. I., p. 352, 1820 ; Dumont, Dict. Sci. Nat. (Levrault), Vol. XXXV., p. 472, 1825.

Anser melanoleucus Vieillot, Nouv. Dict. d'Hist. Nat., Vol. XXIII., p. 344, 1818 ; *id.*, Tabl. Ency. Meth. Orn., Vol. I., p. 352, 1820 ; Dumont, Dict. Sci. Nat. (Levrault), Vol. XXXV., p. 472, 1825.

Bernicla ? melanoleuca Stephens, in Shaw's Gen. Zool., Vol. XII., pt. 2, p. 62, 1824.

Bernicla semipalmata id., *ib.*, p. 64.

Anas (Anseranas) melanoleuca Lesson, Manuel d'Orn., Vol. II., p. 418, 1828 ; *id.*, Traité d'Orn., p. 633, 1831.

Choristopus semipalmatus Eyton, Monogr. Anatidæ, p. 9, 1838.

Anseranus melanoleucus Gray, List Genera Birds, p. 72, 1840.

Anseranas melanoleucus Gray, List Genera Birds, 2nd ed., p. 92, 1841 ; *id.*, List Birds Brit. Mus., pt. III., p. 125, 1844 ; *id.*, Genera Birds, Vol. III., p. 604, 1845 ; Reichenbach, Synops. Av. Natatores, pl. 101, fig. 950, 1845 ; pl. 91, fig. 2654, 1850 ; Leichhardt, Journ. Overl. Exped., pp. 386, 429, 490, 1847 ; Gould, Birds Austr., Vol. VII., pl. 2, 1848 ; Reichenbach, Nat. Syst. Vögel., p. ix., tab. x., 1852 ; Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 649, 1856 ; Zuchold, Journ. für Orn., 1858, p. 41 ; Bennett, Gath. Naturalist Austr., p. 239,

THE BIRDS OF AUSTRALIA.

1860 ; *id.*, Proc. Zool. Soc. (Lond.), 1861, p. 266 ; Sclater *ib.*, 1862, p. 185 ; Gould, Handb. Birds Austr., Vol. II., p. 352, 1865 ; Schlegel, Mus. Pays-Bas, Anseres, Vol. VI., p. 92, 1866 ; Müller, Proc. Zool. Soc. (Lond.), 1869, p. 280 ; Gray, Handl. Gen. Sp. Birds, pt. III., p. 73, 1871 ; Giebel, Thes. Ornith., Vol. I., p. 374, 1872 ; Ramsay, Proc. Zool. Soc. (Lond.), 1875, p. 590 ; *id.*, *ib.*, 1877, p. 345 ; *id.*, Proc. Linn. Soc. N.S.W., Vol. I., pp. 194, 217, 219, 1877 ; *id.*, *ib.*, Vol. II., p. 200, 1878 ; Diggles, Birds Austr., Vol. II., pl. 109, 1877 ; Sclater, Proc. Zool. Soc. (Lond.), 1880, pp. 497, 535 ; Forbes, *ib.*, 1882, p. 350 (trachea) ; Ramsay, Tab. List Austr. Birds, p. 22, 1888 ; Petterd, Papers Proc. Roy. Soc. Tasm., 1888, pp. 91, 92, 1889 ; Lumholtz, Among Cannibals, p. 383, 1889 ; North, Trans. Roy. Soc. South Austr., Vol. XXII., p. 189, 1898 ; Macgillivray, Emu, Vol. XIII., p. 146, 1914.

Cygnus melanoleucus Schlegel, Die Dierent, p. 277, 1864.

Anseranas semipalmatus Eyton, Synop. Anat., p. 23, 1869.

Choristopus melanoleucus Sundevall, Meth. Nat. Av. disp. Tent., p. 145, 1872 ; Reichenow, Vögel. Zool. Gart., p. 68, 1882 ; Heine and Reichenow, Nomencl. Mus. Hein., p. 340, 1890.

Anseranas semipalmata Stejneger, Stand. Nat. Hist., Vol. IV., Birds, p. 139, 1885 ; Salvadori, Cat. Birds Brit. Mus., Vol. XXVII., p. 44, 1895 ; Hall, Key Birds Austr., p. 105, 1899 ; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 1017, 1901 ; Le Souëf, Emu, Vol. II., p. 159, 1903 ; Hill, *ib.*, p. 166, 1903 ; Carter, *ib.*, Vol. III., p. 211, 1904 ; Kilgour, *ib.*, Vol. IV., pp. 38, 42, 1904 ; Hall, Key Birds Austr., 2nd ed., p. 105, 1906 ; Sharpe, Hist. Coll. Nat. Hist. Brit. Mus., Vol. II., pp. 152-3, 1906 ; Austin, Emu, Vol. VII., p. 78, 1907 ; Mathews, Handl. Birds Austral., p. 34, 1908 ; Hall, Emu, Vol. IX., p. 79, 1909 ; Van Oort, Nova Guinea, Vol. IX., Zool., p. 55, 1909 (New Guinea) ; Littler, Handb. Birds Tasm., p. 214, 1910 ; Mathews, Emu, Vol. X., p. 106, 1910 ; Broadbent, *ib.*, p. 244, 1910 ; Mathews, Nov. Zool., Vol. XVIII., p. 235, 1912 ; Stone, Emu, Vol. XII., p. 121, 1912 ; Hill, *ib.*, p. 253, 1913 ; North, Austr. Mus. Spec. Cat., no. 1, Vol. IV., p. 55, 1913 ; Mathews, List Birds Austr., p. 87, 1913 ; *id.*, Ibis 1914, p. 107.

Anseranas semipalmata hamiltoni Mathews, Austral Av. Rec., Vol. I., p. 85, 1912 ; Parry's Creek, North-West Australia.

DISTRIBUTION. Australia and Tasmania.

Adult male. Head and neck all round, back, wings, tail, and thighs glossy blackish-brown ; upper back, short scapulars, and innermost lesser wing-coverts white ; the abdomen, under tail-coverts, and inner under wing-coverts ; the marginal under wing-coverts dark brown. Bill, distal quarter and distal half of cutting edge leaden grey, remainder of bill reddish-brown, which becomes dull purple round the eye ; iris brown ; tarsi and feet yellow. Total length 880 mm. ; culmen from top of knob 110, wing 458, tail 170, tarsus 102.

Adult female. Similar to the adult male, but smaller, the knob on the bill not developed, and the white on the upper parts not so pronounced. Total length 700 mm. ; culmen 84, wing 370, tail 130, tarsus 92.

Immature male. Similar to the adult female, but the knob on the bill slightly more developed.

PIED GOOSE.

Nestling. Upper surface brown, head darker ; on the wing a buff bar ; from the wings, on either side of the back, runs a buff stripe ; abdomen whitish ; sides and throat brownish ; fore-head and a stripe over each eye buff ; a stripe from the bill through the eye brown, and another almost from the base of the bill, running up to the nape.

Nest. A large open structure of grass and weeds about two feet across the base, placed in shallow water, the bottom trodden solid and resting on the ground. Inside measurement of egg cavity 14 inches wide by 3 deep.

Eggs. Clutch, five to eleven. Creamy white, surface slightly glossy and pitted. Axis 70 to 80 mm. ; diameter 52 to 55.

Breeding-season. February, March and April.

THIS bird was first described by Latham in the *Trans. Linn. Soc. (Lond.)*, Vol. IV., p. 103, 1798, but was again described in his *Suppl. Index Ornith.*, p. lxxix., 1801, under the name *Anas melanoleuca* ; his first description was reproduced following this and a plate given. The name selected in the first instance had been *Anas semipalmata*, but for some inscrutable reason the other name was used for many years. In the *Supplement*, Latham states that he is indebted to Mr. Lambert for the drawing of the bird, but does not credit that gentleman with the account of its habits he details.

The Lambert drawings have been investigated under the name of the Watling drawings, Watling being the name of the artist, by Dr. Bowdler Sharpe in the *History of the Collections in the British Museum (Natural History)*, Vol. II., p. 153, 1906, where the full note is transcribed. As many of my readers will not have access to the *History*, I here give Watling's note, the first life history of this species :

"This bird is about the size of our native Wild Goose. They are generally found in flocks and sometimes perching upon high trees. It has been observed by the man who sometimes shoots these birds that, in opening some of them, but not all, the windpipe formed several beautiful circumvolutions on the breast under the skin before it entered the thorax. An officer lately has opened one and confirms the truth of the sportman's observations. It is called by us the New South Wales Goose, palmated, instead of being web-footed, because its manner as well as taste and flavour resembles that bird more than any other. The contour or general likeness is here very well observed. I have been informed that at times their note is tuneful and melodious, which appears probable from the conformation of the windpipe, if that singular circumstance is true. I have now a man out attending a pond where they most frequent, in hopes of getting one for dissection. They have only lately been observed and shot, principally on a pond near the Hawksburgh River, January 2nd, 1794. Native name Now-al-gang."

In the same drawings there was another picture with a note, "This bird is about the size of a goose. Native name Bur-ra-yen-ne." Upon this figure

THE BIRDS OF AUSTRALIA.

Latham founded his other name *Anas melanoleuca*, not recognising that the drawing referred to his earlier named *Anas semipalmata*.

Mr. J. P. Rogers' notes read as follows:—

“Feb. 23, 1902. Eleamurda Swamp, North-west Australia. Nest contained seven eggs: was in a shallow swamp covered with long water-grass and weeds and consisted of a large mass of grass and weeds about 24×24 inches wide at the water-line. The nest was not floating but rested on the bottom and was trodden solid. The bowl containing the eggs measured $14 \times 14 \times 3$ inches deep and the nest tapered from the water-line to the nesting bowl. The nests of this bird are easily found; if when wading through the swamps a single bird rises, search the place and the nest will usually be found in the centre of a little clearing. The birds drag the nearest weeds together to make the nest. In this district the geese rise straight from the nest, whilst the other waterfowl usually creep away before rising, unless surprised.

“March 5, 1902. Same locality. Nest contained eleven eggs, centre of swamp water 18 inches deep. Nest was very large, being 48×30 inches at the water-line, sloping up to the top where it measured 18×18 inches outside measurement. Inside $16 \times 16 \times 5$ deep. This is by far the largest nest I ever saw.

“Nov. 23. Had a heavy shower and two hours after a large flock flew round to see if the swamps were filled. A month ago they were rare, now they are seen everywhere. I saw a flock of 200 on Parry's Lagoons on the 25th Nov. They are to be heard trumpeting as they fly to and fro at night. On Dec. 7th they left the water and are now feeding in the short new grass on the plains. There must be over one thousand on the plains now. A flock of 250 passed my house at 10 a.m.

“Dec. 19, 1908. An immense flock of these birds spent the day in a dry swamp near my camp in which are only a few little puddles. There were about 500 of them. When I first heard them this morning I thought the flood waters had come down, the low roar of their voices being not unlike the roar of the flood water.

“Dec. 20, 1908. The rains last night put 2 inches of water in the swamp, the water covering about 2 acres.

“Jan. 26, 1909. In large flocks, but not breeding, as water is not plentiful. Feed on a species of millet which grows in swampy ground and bears a heavy crop of seed.

“Feb. 10, 1909. Saw the blacks with some eggs.

“March 12, 1909. Have just heard that a party of three took 100 eggs of this species from a swamp 9 miles north of my camp.

PIED GOOSE.

"April 20, 1909. These birds have not bred freely this year: the rains were late and the grass and reeds did not grow long enough in the swamps to provide good cover. Are in very large flocks at present.

"Nov. 20, 1911. Cooper's Camp, Melville Island. To-day four of these birds passed over my camp, the first seen here.

"Dec. 30, 1911. At my camp on the north side of the island many flocks passed over every evening and were fairly numerous on the large swamp up to this date.

"Jan. 13, 1912. No flocks seen for the past few days.

"Jan. 14, 1912. I had a long trip through the big swamp to-day: was out about ten hours in a canoe and only saw two single birds; these birds are said to breed in this swamp, but I consider that only a few stragglers do so. Too many crocodiles in it in the wet season for many breeding waterfowl."

Though first described from the Hawkesbury River, New South Wales, it had disappeared from that locality before Gould's time (1838-40). It is now very rare throughout southern-eastern Australia, as Mr. J. W. Mellor writes me: "These geese were at one time found in South Australia on lakes Alexandrina and Albert, and other swampy localities, but I have not seen or heard of them being here for years now."

Hall, writing about the Ducks of the Murray River (*Emu*, Vol. IX., p. 79, 1909) states: "Is a grass feeder. In 1902, the great drought year, farmers in this locality poisoned them because they were feeding almost entirely on the growing crops. Up to 1902 I knew them to be annually in thousands. Cultivation has driven them away for good, so far as present generations are concerned."

Stone records the same tale (*Emu*, Vol. XII., p. 121, 1912) from Lake Boga, Victoria: "Aboriginal name 'Gnak.' Very rare. In 1892 hundreds of these geese could be seen at any time with very little trouble. I saw 15 shot with 3 barrels of a 12-bore." He amplified this in the *Emu*, Vol. XIII., p. 83, 1913: "Then one's attention would be drawn to a string of Pied Geese (*Anseranas melanoleuca*) 'Gnack,' passing almost overhead from one reed-bed to another, 'honk-honking' as they went. Thousands were to be seen with little trouble, and they nested in the snake-infested reed-beds at some seasons. They were unsuspicious birds, and could be easily shot. Settlement has driven them far away and it is years since I saw one in the district."

In the north of Australia, however, these wonderful birds still numerously exist, thus Le Souëf noted (*Emu*, Vol. II., p. 159, 1903): "These birds are plentiful in the Northern Territory (Port Darwin District), where they have not been much disturbed by man."

THE BIRDS OF AUSTRALIA.

Mr. Tom Carter has provided the accompanying note: "On Sept. 18, 1892, a small flock of these birds was resting on the beach at Maud's Landing, North-west Australia, and allowed me to ride close past them without taking flight. About an hour afterwards I saw them swimming on the sea. In the wet year of 1900 numbers of these birds were on the flooded flats near Winning, 50 miles inland from Point Cloates. A teamster who passed there with a load of wool told me of some strange wild geese he had seen, coloured black white and red. He also told me of the Spoonbills which the black boys had eaten. The mention of these strange birds caused me to make a hurried special trip to the scene, and the geese I found to be semipalmated, many of them having their under parts much stained with red clay mud! Nov. 1, 1905. I walked within 5 yards of one of these birds as it rested on the edge of a stock tank at Wensleydale. It was gone an hour afterwards."

Hill (*Emu*, Vol. XII., p. 253, 1913), reporting on the birds of the Barclay Expedition, records at Borrooloola: "The first arrivals appeared near our camp on 20th January, and remained about the submerged grass country until we left the district. Large flocks were seen flying south-west towards the latter part of the month. According to the natives, looped tracheæ are frequently seen in these geese. I examined about 10 specimens, only one of which (an old male) showed this form of trachea. In this case the trachea passed twice down the left pectoral muscle to near the vent before it entered the body. A few parasites (*Mallophaga*) were found on one specimen only."

Mr. J. A. Boyd, writing to Mr. A. J. North from North-eastern Queensland (*Austr. Mus. Spec. Cat.*, no. 1, Vol. IV., p. 56, 1913) states: "I do not think the Magpie Geese laid last season: they certainly did not near here, the first time they have missed since I came. When out at Goose Lagoon some months ago I saw no sign of old nests, nor, though I saw literally thousands of these birds, did I notice a single young one. . . . Since I last wrote you I have been inquiring from the blacks, who feed largely on these eggs when in season, and they assert that unless the geese can build in water they will not build at all. The bird in these parts builds its nest exclusively of a flag or rush that grows some ten feet high: a tussock of these is first selected and trampled down, the flags all round are cut and added on top of this foundation, until it is some two feet above water, and on this again, of the same material, the nest proper is formed. Last year, owing to the drought and scarcity of feed, these rushes did not grow well, and were eaten down by the cattle as soon as they appeared, so the birds could hardly have bred had they been inclined to do so."

PIED GOOSE.

In the same place (p. 57) is a note by Mr. George Savidge from Copmanhurst, New South Wales, confirming the sad news of its extermination in this State :

“The Semipalmated Goose (*Anseranas semipalmata*) is a very scarce bird on all parts of the Clarence River now. About twenty years ago it could be seen on the large swamps below Grafton in many hundreds ; so plentiful was it that I have seen seven brought down at one discharge of the gun. It used to breed occasionally, constructing a large nest of rushes and herbage, etc. A clutch of fourteen eggs in my possession was taken from the Ulmarra Swamps.”

I recently recognised the bird from North-west Australia as constituting a distinct subspecies characterised by its larger size and in having the knob on the head larger. I associated with this form the birds inhabiting the Northern Territory.

Gould, however, noticed (*Handb. Birds Austr.*, Vol. II., p. 353, 1865) that “the specimens from the north are somewhat smaller than those from the south coast, and have the knob on the bill rising higher on the fore-head.” The smaller size of the Northern Territory birds would seem to be confirmed by the egg measurements given by Le Souëf. Longer series are necessary to determine the differences between the North-west and Northern Territory birds, and as both agree in the greater prominence of the knob on the bill, as observed by Gould and myself, I have concluded to withdraw my North-western form for the present and treat simply as a whole the forms from Australia. Van Oort (*loc. cit.*) has recently recorded the species from New Guinea, the first extra-limital note of its extension of range.

The bird figured and described was collected at Parry's Creek, North-west Australia, on the 1st of February, 1909, by Mr. J. P. Rogers.

GENUS—CHENISCUS.

CHENISCUS Eyton, Monogr. Anatidæ, p. 15, 1838.. Type *C. coromandelianus*.
Microcygna Gray, List Genera Birds, p. 73, 1840.. Type *C. coromandelianus*.
Anserella Swainson, Classif. Birds, Vol. II., p. 189,
 1837, nom. nud.; Gray, Handl. Gen. Sp. Birds,
 pt. III., p. 77, 1871 Type *C. coromandelianus*.

VERY small Anserine birds with short deep bills, long wings, medium tail, short legs, and long toes.

The bill is shorter than the head and deep at base, the depth being more than half the chord of the culmen. The nostrils are small and circular, placed high up near base of culmen, close together on each side of culmen ridge. The inner edge of upper mandible is strongly serrated, while the nail is broad and overhangs the under mandible like a spout; the under mandible is very flat, the mandibular ridges pronounced and strongly serrated, enclosing a deep unfeathered groove. Neck of medium length. The wings are long, with the first and second primaries longest and subequal. The tail is medium, less than half the length of the wing, and rounded in shape.

The metatarsus is short, covered with reticulate scales, which, however, are so enlarged on the front towards the feet as to appear like scutellæ. In length the metatarsus is equal to or rather longer than the culmen and less than half the tail. The toes are long, fully webbed; the middle toe without the nail is longer than the metatarsus and about half the length of the tail. The hind toe is long, not lobed. The peculiar little birds comprising the genus *Cheniscus* bear in Australia the vernacular name of Goose-Teal, which is a good explanatory name, as, though having the general characters associated with a goose, they are only the size of a teal.

In the *Catalogue* of Birds in the British Museum, Vol. XXVII., Salvadori placed them in a subfamily *Plectropterinae*, a group of goose-like birds of varied forms, not otherwise easily classed. This group was apparently characterised as opposed to the geese proper by the length of the hind toe and generally glossy plumage, a somewhat artificial classification.

CHENISCUS.

There these birds are also associated with the Madagascar *Nettapus auritus* (Boddaert) in the genus *Nettapus*.

The Australian birds, however, differ in having the bill shorter and not so deep, the nostrils smaller and placed nearer the base of the culmen, and longer legs and feet. The culmen in *Nettapus* exceeds the metatarsus in length, while the tail is more than half the length of the wing, and the upper tail-coverts extend to the tip of the tail; in *Cheniscus* the upper tail-coverts do not hide the tail.

The differences can be well estimated when it is noted that G. R. Gray, who was no genus splitter, not only admitted they were generically separable, but further placed them in different subfamilies. The present genus he re-named *Microcygna*, as he considered *Cheniscus* to be pre-occupied; this genus name is an endeavour to express a suggestion of their aspect. Swainson also gave *Anserella* to this group with a similar reason. I would suggest that an examination of the anatomy of these forms will enable a better location than the present, which can only be considered a temporary expedient.

Key to the Species.

- A.* Neck white ; sides of body minutely freckled with
grey and white *C. albipennis*, p. 35
- B.* Neck glossy green ; sides of body barred with
green and white *C. c. pulchellus*, p. 38



H. Grönvold, del

Witherby & Co

NETTAPUS ALBIPENNIS.
(WHITE-QUILLED GOOSE TEAL)

CHENISCUS COROMANDELIANUS ALBIPENNIS.

WHITE-QUILLED GOOSE-TEAL.

(PLATE 202.)*

NETTAPUS ALBIPENNIS Gould, Birds Austr., Vol. VII., text to pl. 5, 1842; Moreton Bay, Queensland.

Nettapus coromandelianus Gould, Birds Austr., Vol. VII., pl. 5, 1842; Gray, Genera Birds, Vol. III., p. 608, 1844 (part).

Nettapus albipennis Gould, Birds Austr., Vol. VII., text to pl. 5, 1842; *id.*, Birds Austr., Vol. I., Introd., p. xci., 1848; *id.*, Introd. Birds Austr., 8vo., p. 107, 1848; Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 649, 1856; Gould, Handb. Birds Austr., Vol. II., p. 359, 1865; Schlegel, Mus. Pays-Bas, Anseres, Vol. VI., p. 77, 1866; Blyth, Ibis 1866, p. 350 (note); Pelzeln, Ibis 1873, p. 122; Giebel, Thes. Ornith., Vol. II., p. 701, 1875; Ramsay, Proc. Zool. Soc. (Lond.), 1877, p. 346; *id.*, Proc. Linn. Soc., N.S.W., Vol. II., p. 200, 1878; Ramsay, Tab. List Austr. Birds, p. 22, 1888; Salvadori, Cat. Birds Brit. Mus., Vol. XXVII., p. 72, 1895; Hall, Key Birds Austr., p. 106, 1899; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 1020, 1901; Hall, Key Birds Austr., 2nd ed., p. 106, 1906; Mathews, Handl. Birds Austral., p. 34, 1908; North, Austr. Mus. Spec. Cat., no. 1, Vol. IV., p. 59, 1913.

Nettapus bicolor Lesson, Echo du Monde Savant, 11th year, no. 6, col. 127, July 21, 1844 (Queensland); *id.*, Desc. Mamm. et d'Ois., p. 245, 1847; Menegaux (reprint of Lesson 1844), Art. d'Orn., p. 149, 1913.

Nettapus corom. albipennis Reichenbach, Synops. Av. Natatores, pl. 96, figs. 936-37, 1845.

Nettapus (Anserella) albipennis Gray, Handl. Gen. Sp. Birds, pt. III., p. 77, 1871.

Nettapus coromandelicus Giebel, Thes. Ornith., Vol. II., p. 701, 1875 (part).

Anserella albipennis Reichenow, Ornith. Centralbl., 1882, p. 22.

Nettapus coromandelianus albipennis Hartert, Katal. Vogels Mus. Senckenb., p. 228, 1891; Mathews, Nov. Zool., Vol. XVIII., p. 236, 1912.

Cheniscus coromandelianus albipennis Mathews, List Birds Austr., p. 87, 1913.

DISTRIBUTION. Queensland; northern New South Wales.

Adult male. Back and scapulars glossy-green, with a bronzy tinge; wings bright glossy-green, some of the median-coverts tinged with purple; primary-quills dark brown, glossed with green and broadly banded with white, some of the inner short primaries only tipped with white like the secondaries, the long

* The Plate is lettered *Nettapus albipennis*.

THE BIRDS OF AUSTRALIA.

innermost secondaries glossy-brown; sides of rump and upper tail-coverts minutely spotted with brown and white; tail glossy-brown; crown of head purplish-brown, with pale edgings to the feathers on the fore-head; throat and sides of face pure white; neck all round white, some of the feathers tipped with brown; a glossy-black collar on the fore-neck, green on the hind-neck where it is divided from the back by a white band; sides of body and flanks minutely speckled with grey and white; breast and abdomen pure white; under tail-coverts tipped with black or blackish-brown; axillaries and under wing-coverts bronzy-green. Bill black; iris brown; feet greenish slate-colour. Total length 354 mm.; culmen 25, wing 176, tail 64, tarsus 27.

Adult female. Distinguished from the adult male chiefly by the absence of the broad white bar on the primaries, the secondaries more narrowly tipped with white, and the white on the hind-neck divided by a narrow line of dark brown. Total length 315 mm.; culmen 23, wing 168, tail 64, tarsus 27.

Young female. Differs from the adult female in being brown above, barred with brown and white on the upper mantle and sides of neck, a dark loreal streak which extends behind the eye, under wing-coverts brown edged with white, sides of the body pale brown, and the under tail-coverts pure white.

Two specimens obtained in the winter (July) have the entire back purplish-brown. I imagine this to be the winter plumage, but the material at hand is not sufficient to prove it.

Nest. "A hole in a tree."

Eggs. Apparently the only authentic egg yet known is one taken from the oviduct of the bird and described by North thus: "Oval in form, and of a faint creamy-white colour, the text of the shell being very fine and smooth to the touch but without any gloss. Length 1.79×1.4 inches."

Breeding-season. Undetermined.

I HAVE been unable to trace any record of the life history of this bird, the only two notes I have seen reading:—"Whilst *Nettopus pulchellus* is most common on the west of the Northern Territory, the White-quilled Pygmy Goose is more numerous on the Queensland side. Near Charters Towers they breed regularly. Mrs. Chas. Clarke, of Maryvale Station, informed me that one of the station natives took a clutch of sixteen eggs of this species from a hole in a tree, only a few feet away from the nest of a Common Teal, in which he found six eggs. Both species are found on some of the swamps of the Northern Territory of South Australia."*

"One of the birds had its nest in the spout of a gumtree, about seventy feet from the ground, in my garden at South Grafton, and, from what I remember, there were seven or eight young ones which she carried out in her bill after they were hatched. The spout almost overhangs a small creek. I recollect a young one falling out of the nest into the water, but it swam away unconcerned. I know of other nests in trees about our swamps."†

* Kearland, *Austr. Mus. Spec. Cat.*, no. 1, Vol. IV., p. 59, 1913.

† Wilcox in *Campbell's Nests and Eggs*, Vol. II., p. 1020, 1901.

WHITE-QUILLED GOOSE-TEAL.

Such notes, being unauthenticated, are comparatively valueless, and truly speaking nothing is known about the habits of this bird.

It was differentiated by Gould on account of its larger size and the more extensive white quill-lining when compared with Indian birds. The former character is unstable, so that it can only be regarded as subspecifically distinct.

The bird figured and described was collected at Mackay, North Queensland.

CHENISCUS PULCHELLUS.

GREEN GOOSE-TEAL.

(PLATE 203.)*

NETTAPUS PULCHELLUS Gould, Proc. Zool. Soc. (Lond.), 1841, p. 89; Port Essington, Northern Territory.

Nettapus pulchellus Gould, Proc. Zool. Soc. (Lond.), 1841, p. 89; *id.*, Birds Austr., Vol. VII., pl. 4, 1842; Gray, Genera Birds, Vol. III., p. 608, 1844; Reichenbach, Synops. Av. Natat., pl. 96, figs. 938-939, 1845; Stokes, Discov. in Austr., Vol. I., p. 483, 1846; Blyth, Cat. Birds Mus. As. Soc. Bengal, p. 302, 1852; Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 649, 1856; Elsey, Proc. Zool. Soc. (Lond.), 1857, p. 28; Gray, *ib.*, 1858, p. 198; *id.*, Cat. Birds New Guin., p. 63, 1859; Finsch, New Guinea, p. 183, 1865; Gould, Handb. Birds Austr., Vol. II., p. 357, 1865; Schlegel, Mus. Pays-Bas, Anseres, Vol. VI., p. 77, 1866; Ramsay, Proc. Zool. Soc. (Lond.), 1868, p. 388; Eyton, Synops. Anat., p. 37, 1869; Giebel, Thes. Ornith., Vol. II., p. 701, 1875; Ramsay, Proc. Linn. Soc. N.S.W., Vol. I., pp. 194, 386, 1877; Vol. II., p. 200, 1878; Masters, *ib.*, p. 276, 1878; D'Albertis, Ibis 1877, p. 372; Ramsay, Proc. Zool. Soc. (Lond.), 1877, p. 346; Sclater, Proc. Zool. Soc. (Lond.), 1883, pp. 52, 200; Finsch, Vögel. Süd-See, p. 29, 1884; Forbes, Proc. Zool. Soc. (Lond.), 1884, p. 434; Ramsay, Tab. List Austr. Birds, p. 22, 1888; Salvadori, Agg. Orn. Papua. e Moll., p. 210, 1891; North, Trans. Roy. Soc. South Austr., Vol. XXII., p. 189, 1898; Mathews, Nov. Zool., Vol. XVIII., p. 236, 1912; Van Oort, Nova Guinea, Vol. IX., Zool., p. 55, 1909; Macgillivray, Emu, Vol. XIII., p. 146, 1914; Barnard, *ib.*, Vol. XIV., p. 41, 1914.

Nettapus (Anserella) pulchellus Gray, Handl. Gen. Sp. Birds, pt. III., p. 77, 1871.

Nettopus pulchellus Sclater, Proc. Zool. Soc. (Lond.), 1880, p. 505; Salvadori, Ann. Mus. Civ. Genov., Vol. XVIII., p. 400, 1882; *id.*, Orn. Papua. e Moll., Vol. III., p. 384, 1882; *id.*, Cat. Birds Brit. Mus., Vol. XXVII., p. 67, 1895; Hall, Key Birds Austr., p. 106, 1899; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 1019, 1901; Kilgour, Emu, Vol. IV., pp. 38, 42, 1904; Hall, Key Birds Austr., 2nd ed., p. 106, 1906; Berney, Emu, Vol. VI., p. 156, 1907; Mathews, Handl. Birds Austral., p. 34, 1908; Ingram, Ibis 1908, p. 464; Sassi, Journ. für Ornith., 1909, p. 383; Mathews, Emu, Vol. X., p. 106, 1910; Broadbent, *ib.*, p. 245; Hill, *ib.*, Vol. XII., p. 254, 1913; North, Austr. Mus. Spec. Cat., no. 1, Vol. IV., p. 58, 1913.

* The Plate is lettered *Nettapus pulchellus*.



H. Grönvold del

Witherby & Co.

$\frac{1}{2}$
NETTAPUS PULCHELLUS.
(GREEN GOOSE TEAL).

GREEN GOOSE-TEAL.

Anserella pulchella Reichenow, Ornith. Centralbl. 1882, p. 22.

Cheniscus pulchellus Mathews, List Birds Austral., p. 88, 1913; *id.*, Ibis 1914, p. 107.

DISTRIBUTION. North-west Australia; Northern Territory; Queensland (New Guinea).

Adult male. Crown of head greenish-black minutely barred with sandy buff; neck all round, entire back, scapulars, and wings glossy bottle-green; bastard-wing, primary-coverts, and primary-quills black; secondaries for the most part white, some of the outer ones margined with glossy black at the tips, and some of the inner ones black on the inner webs towards the base, the long innermost secondaries like the back more or less fringed with black; the upper tail-coverts minutely speckled with white; tail black with a slight tinge of green on the outer webs of the feathers; a narrow line at the base of the fore-head, loreal space, sides of face, ear-coverts, and chin pure white; upper throat and fore-part of cheeks intermixed with black; the feathers on the lower fore-neck and sides of breast barred with green and white; lower flanks longitudinally marked with green and white or brown and white; the short outer under tail-coverts barred with brown and white, the remainder blackish like the under-surface of the tail; breast and abdomen white; axillaries and under wing-coverts dark glossy-green. Bill: nail of upper and the whole of the lower mandible flesh-colour, base of lower and balance of upper mandible black; iris brown; tarsi and feet black. Total length 375 mm.; culmen 26, wing 168, tail 70, tarsus 26.

Adult female. Differs from the adult male by having the fore-part of the neck barred with white instead of being uniform green, loreal space and sides of face minutely speckled with black, a fairly well-marked superciliary streak, the crown of the head uniform glossy-brown, and the under tail-coverts brown instead of black. Bill: nail leaden grey, upper mandible brown, lower mandible pale brown; iris brown; tarsi and feet leaden colour. Total length 375 mm.; culmen 25, wing 172, tail 70, tarsus 25.

Immature male. Almost uniform on the crown of the head, with the slightest indication of a superciliary streak, and dark spots on the sides of the face and a mixture of white on the fore-neck.

Younger birds have a more pronounced superciliary streak, a narrow white collar separating the crown from the hind-neck, the feathers on the lower flanks marked longitudinally with brown and white lines, the sides of the face white with small brown dots which become much coarser on the fore-neck—resembling the female in this respect.

Nestling. Head black; a white band from the side of the neck round the back of the head; back brown, getting darker towards the tail which is black; on the wings a white bar; under-surface white; fore-head and a line over each eye white like the lores and face; a dark streak extends from the bill through the eye, getting broader after passing the eye and going back.

Nest. "Constructed of long dry grasses, the slight cavity for the eggs being sometimes lined with feathers and down; usually resting upon the surface of the water among the herbage of a swamp or lagoon. Possibly the eggs are occasionally deposited in hollow trees" (Campbell).

Eggs. "Blunt ellipses in form and faint creamy-white in colour, the shell being very smooth, lustrous and more or less nest stained, two of the specimens so much so that they are of a uniform light brown. Measurements in inches: 1.69-1.75 × 1.33-1.36 (North); 38-40.5 × 29-29.5 mm." (Hill).

Breeding-season. February and March (North).

THE BIRDS OF AUSTRALIA.

AGAIN it must be recorded that very little is known of the life-history of this bird.

Mr. J. P. Rogers, writing from Melville Island, states: "Dec 30, 1911. This species was very numerous on the edges of the great swamp. On Jessie Creek on the 29th Dec. several pairs were seen perched on trees 30 yards back from the water. Jan. 10, 1912. Still very common here. I have shot many for food, all of which were dissected: apparently they will be breeding very shortly, but none of those examined had laid, but in some the eggs in the ovaries were as large as haricot beans. This species perches in the trees freely and possibly they also breed in the trees at times. Their note is a fairly loud whistle."

Kearland recorded (*Trans. Roy. Soc. South Austr.*, Vol. XXII., p. 189, 1898): "Several flocks of these little geese were seen on the south side of the Fitzroy River. They were very shy, and difficult to approach. When disturbed they arose quickly, and flew near the surface of the water, making a peculiar whistling noise all the time they were on the wing."

"Mr. T. A. Gulliver, Townsville (Queensland), with whom this little goose was a special favourite, from observations made at Normanton, Gulf of Carpentaria, came to the conclusion that the bird breeds in the large fresh-water lakes some distance inland, and migrates to the shores of the Gulf as soon as the young can fly. About the middle of February, or as soon as the water in the lagoons at Normanton gets low, and consequently brackish, the little goose makes its exit, and is not seen again until the beginning of the next wet season. On their first arrival numbers of them are of a dull colour, and proved to be young birds. Before they take their departure they are all full plumaged."*

Berney's only note (*Emu*, Vol. VI., p. 156, 1907) reads: "Two birds were shot out of three that were seen at Maxwellton woolshed on Alec's Creek, in this locality, during November 1906. As the birds were strangers, a wing was saved for me, enabling me to include them in my local list."

Hill states (*Emu*, Vol. XII., p. 254, 1913): "Found on nearly all the swamps. In February pairs were numerous in submerged open forest country near Borroloola, where they evidently intended to nest. A native brought me three eggs on 3rd March, which were taken from a nest built in the grass near a swamp. Towards the end of March I saw several broods of young birds in a waterhole near the head of the Wickham River."

Mr. Tom Carter writes me: "Although I have not personally seen this species, I have been told of specimens shot at Lake Ewlymartiys, east of

* Campbell, *Nest and Eggs Australian Birds*, p. 1020, 1901.

GREEN GOOSE-TEAL.

Broome Hill, and also at Lake Muir, by persons who shot them, and from the description they must have been this species."

Kearland has contributed the present note to North (*Austr. Mus. Spec. Cat.*, no. 1, Vol. IV., p. 59, 1913): "At all the swamps or lagoons along the course of the Fitzroy River, North-western Australia, the pretty little Pygmy-Goose (*Nettopus pulchellus*) may be seen in flocks of about a dozen, either feeding on the grass like the ordinary domestic goose or swimming in the water. When disturbed they utter a peculiar cry. They usually lay their eggs in a hollow branch, sometimes far from water. I have known of thirteen eggs being found in a nest."

Although Kearland remarked upon their shyness it should be observed that Gregory (Gould, *Handb. Birds Austr.*) reported: "This elegantly symmetrical waterfowl was only found on the Sherlock River. It is remarkable for its tameness, and for its light and sportive movements on the water. It was seen in flights of eight or ten together."

Gilbert, who discovered the species, had previously noted (Gould, *Birds Austr.*): "It is an extremely shy species, and at the slightest movement of anything near it, dives and remains under water a long time."

The bird figured and described was collected at Parry's Creek, North-west Australia, on the 4th of February, 1909, by Mr. J. P. Rogers.

GENUS—CEREOPSIS.

CEREOPSIS Latham, Index Ornith. Suppl., p. lxvii.,

1801 Type *C. novæhollandiæ*.

LARGER Anserine birds with short, cere-bearing bill, long neck, long wings, short tail, long stout legs and short toes.

The bill is very short and deep, longer than the head; its depth at base is two-thirds the length of the chord of the culmen; from the base to the nail the upper mandible is covered with a cere; the nostrils are large oval apertures placed in the anterior portion of the cere-covered section; the horny nail is decidedly separated by a triangular ridge, and projects beyond the lower mandible. No lamellæ are visible on the edges of the mandibles.

The under mandible is flat, the mandibular rami obscured for the most part by feathering which covers the interramal space, leaving only a broad flattened spoon-like nail.

The wings are long, the second primary longest, but the first little shorter and equal to the third but longer than the fourth; the primaries are somewhat scalloped.

The tail is short, square, composed of fourteen feathers only about one-third the length of the wing and less than twice the length of the metatarsus.

The legs are long and very stout, covered throughout with reticulate scales; a bare tibia is exposed; the toes are short, little more than half the length of the metatarsus and are fully webbed, but the webs are rather deeply incised; the metatarsus is more than twice the length of the culmen. The hind toe is short; the claws are long.

This extraordinary Anserine form bears little resemblance to others of the Order, and Salvadori in the *Catalogue* of Birds in the British Museum, Vol. XXVII., admitted it as a subfamily *Cereopsinæ*, differentiated by its peculiar cere-bearing bill.

In the *Emu*, Vol. XII., pp. 209-237, pls. xxviii.-xxxiv., 1905, appeared a welcome contribution to our knowledge of this fine bird by Dr. Shufeldt entitled "On the Comparative Osteology of *Cereopsis novæhollandiæ*."

CEREOPSIS.

From this paper I give the following extracts: "There is no existing form of goose that I know anything of which possesses a skull at all resembling that part of the skeleton in *Cereopsis*. . . . Apart from the skull, the remainder of the osteology of this goose presents nothing to indicate that it is an *anserine* outlier among the *Anseres*. As a matter of fact, many of the characters of its trunk skeleton—and more especially is this the case with respect to the appendicular skeleton—are practically in agreement with the corresponding one in the skeletons of such typical geese as we have in *Anser*, *Branta* and *Chen*.

"As to the skull, in some particulars, as have been set forth above, it exhibits a number of very marked differences as compared with that part of the skeleton in such genera of geese as have just been mentioned in the last paragraph. Nevertheless, this skull is withal anserine in its characters, though indicative of belonging to a somewhat aberrant type. . . . Possibly among extinct forms it may have had congeners. . . ."

The extinct genus *Cnemidornis*, from New Zealand, is considered to be very closely related to the present genus, but as Shufeldt concludes, no recent species shows very close relationship.

On pl. xxix., Shufeldt gives for comparison figures of various bones of "*Chenonetta jubata*" taken from New Zealand fossil remains. The specific association seems to me a very dangerous application.

CEREOPSIS NOVÆHOLLANDIÆ.

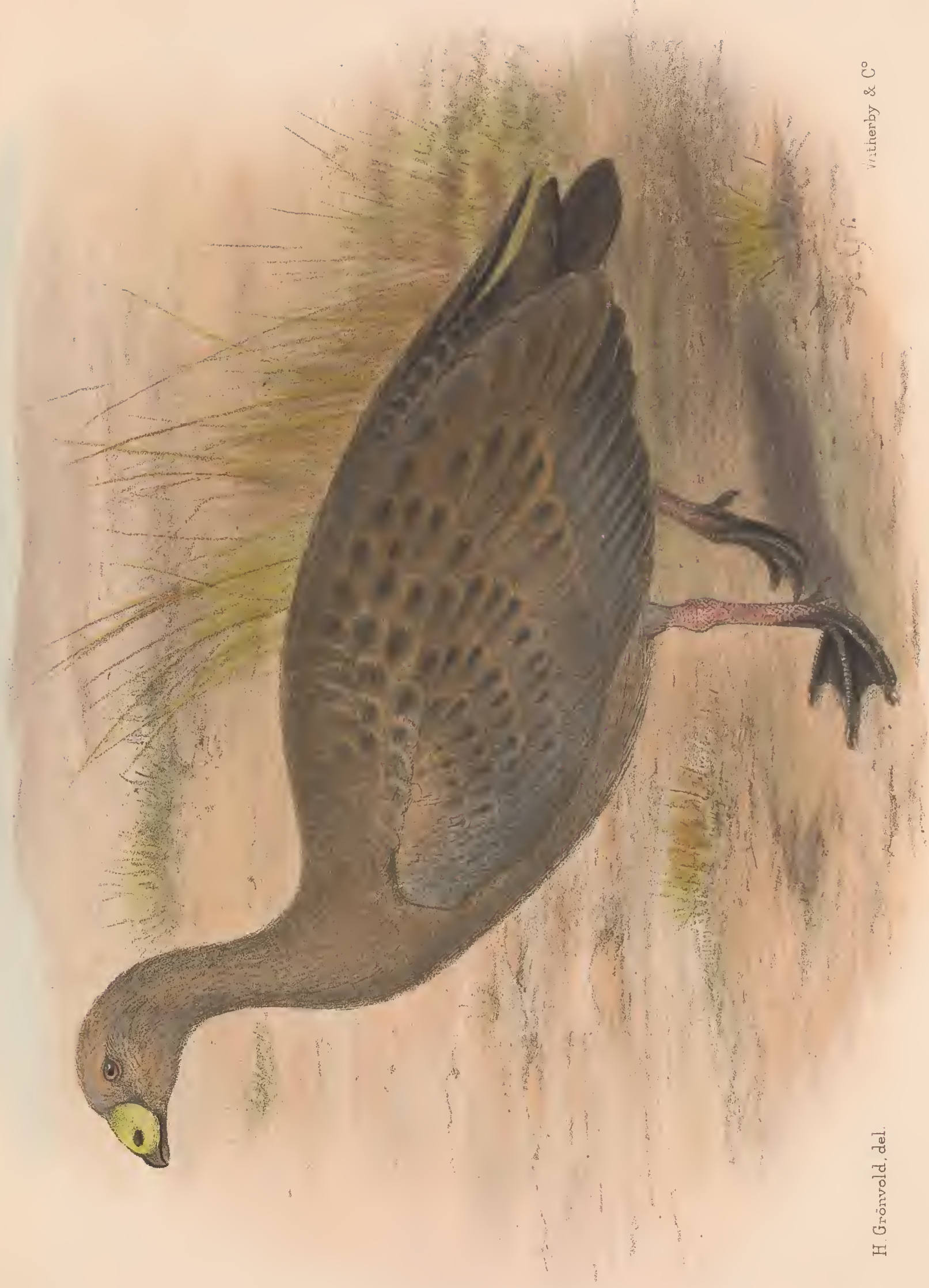
CAPE BARREN GOOSE.

(PLATE 204.)

CEREOPSIS N(OVÆ)-HOLLANDIÆ Latham, Index Ornith. Suppl., p. lxxvii., 1801; Nova Hollandia = Victoria.

New Holland Cereopsis Latham, Gen. Synops. Birds Suppl., Vol. II., p. 325, pl. 138*, 1801.

Cereopsis n(ovæ)-hollandiæ Latham, Index Ornith. Suppl., p. lxxvii., 1801; Illiger, Prodr. Mamm. Av., p. 252, 1811; Vieillot, Anal. nouv. Orn., p. 60, 1816; Temminck, Man. d'Orn., 2nd ed., Vol. I., p. cvii., 1820; *id.*, et Laugier, Planch. Color. d'Ois., Vol. II., livr. 85, pl. 206, 1823; Stephens in Shaw's Gen. Zool., Vol. XII., pt. II., p. 67, pl. 44, 1824; Boie, Isis 1826, p. 981; Ranzani, Elem. Zool., Vol. IX., p. 292, 1826; Lesson, Man. d'Orn., Vol. II., p. 412, 1828; *id.*, Traité d'Orn., p. 627, 1831; Yarrell, Proc. Zool. Soc. (Lond.) 1830, p. 25-6; Bennett, *ib.*, p. 26-7; *id.*, Gard. and Menag. Zool. Soc., pp. 315-24, 1831; Lesson, Compl. de Buff. Ois., Vol. IX., p. 523, 1837; Eyton, Monogr. Anatidæ, p. 80, 1838; Jardine and Selby, Illus. Ornith., N.S., pl. 33, 1839; Rüppell, Mus. Senckenb., Vol. III., p. 11, 1839; Gray, List Genera Birds, p. 72, 1840; *id.*, List Birds Brit. Mus., pt. III., p. 126, 1844; *id.*, Genera Birds, Vol. III., p. 606, 1844; Hartlaub, Syst. Verz. Ges. Mus., p. 117, 1844; Reichenbach, Synops. Av. Natat., pl. 96, figs. 940-1, 1845; Gould, Birds Austr., Vol. VII., pl. 1, 1847; Reichenbach, Nat. Syst. Vögel., p. ix., pl. x., 1852; *id.*, Journ. für Orn., 1853, p. 10; Lichtenstein, Nomencl. Av. Zool. Mus. Berol., p. 101, 1854; Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 648, 1856; Crisp, Proc. Zool. Soc. (Lond.) 1857, p. 215; Selater, *ib.*, 1859, p. 206; Bennett, Gath. Nat. in Austral., p. 237, 1860; Schlegel, De Dierent, p. 279, a. fig., 1864; Gould, Handb. Birds Austr., Vol. II., p. 350, 1865; Schlegel, Mus. Pays-Bas, Anseres, Vol. VI., p. 115, 1866; Eyton, Synops. Anatidæ, p. 15, 1869; Müller, Proc. Zool. Soc. (Lond.) 1869, p. 280; Selater, *ib.*, p. 629; Hutton, Ibis 1870, p. 397; Gray, Handl. Gen. Sp. Birds, pt. III., p. 74, 1871; Nathus, Journ. für Orn., 1871, p. 255; Giebel, Thes. Ornith., Vol. I., p. 613, 1872; Sundevall, Meth. nat. Av. disp. Tent., p. 145, 1872; Hector, Proc. Zool. Soc. (Lond.) 1873, p. 769; Gulliver, *ib.*, 1875, p. 488; Garrod, *ib.*, 1876, p. 197; Ramsay, Proc. Linn. Soc. N.S.W., Vol. I., p. 194, 1876; Vol. II., p. 200, 1878; Gadow, Journ. für Orn. 1877, p. 389; Diggles, Birds Austr., Vol. II., pl. 108, 1877; Schmidt, Proc. Zool. Soc. (Lond.) 1880, p. 317; Selater, *ib.*, pp. 497, 535; Reichenow, Vögel. Zool. Gart.,



H. Grönvold, del.

Witherby & Co

$\frac{1}{4}$

CEREOPSIS NOVÆ HOLLANDIÆ.

(CAPE BARREN GOOSE).

CAPE BARREN GOOSE.

- p. 68, 1882 ; Helm, Journ. für Orn., 1884, p. 334 ; Legge, Papers Proc. Roy. Soc. Tasm. 1886, p. 244, 1887 ; Ramsay, Tab. List Austr. Birds, p. 22, 1888 ; Evans, Ibis 1891, p. 71 ; Hartert, Katal. Vögels Mus. Senckenb., p. 226, 1891 ; Forbes, Trans. New Zeal. Inst., Vol. XXIV., p. 188, 1892 ; Salvadori, Cat. Birds Brit. Mus., Vol. XXVII., p. 79, 1895 ; North, Trans. Roy. Soc. South Austr., Vol. XXII., p. 189, 1898 ; Hall, Key Birds Austr., p. 106, 1899 ; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 1021, 1901 ; Hill, Emu, Vol. II., p. 166, 1903 ; Hall, Key Birds Austr., 2nd ed., p. 106, 1906 ; Mathews, Handl. Birds Austral., p. 34, 1908 ; Armstrong, Emu, Vol. VII., p. 182, 1908 ; MacLaine, *ib.*, p. 192 ; Hall, *ib.*, Vol. IX., p. 132, 1910 ; Littler, Handb. Birds Tasm., p. 215, 1910 ; Mathews, Nov. Zool., Vol. XVIII., p. 236, 1912 ; Mellor and White, Emu, Vol. XII., p. 161, 1913 ; Shufeldt, *ib.*, p. 210-37, pl. xxix.-xxxiv. (Osteology), 1913 ; Mathews, List Birds Austr., p. 88, 1913 ; North, Austr. Mus. Spec. Cat., no. 1, Vol. IV., p. 60, 1913.
- Cereopsis cinereus* Vieillot, Nouv. Dict. d'Hist. Nat., Vol. V., p. 516, 1816 (Victoria) ; *id.*, Galerie d'Ois., Vol. II., p. 211, pl. 284, 1825 ; Cuvier, Regne Anim., 2nd ed., Vol. I., p. 569, 1829.
- Anser griseus* Vieillot, Nouv. Dict. d'Hist. Nat., Vol. XXIII., p. 336, 1818 (Tasmania) ; *id.*, Tabl. Ency. Meth. Ornith., Vol. I., p. 351, pl. 236, fig. 7, 1820 ; Dumont, Dict. Sci. Nat. (Levrault), Vol. XXXV., p. 472, 1818 ; Bennett, Proc. Zool. Soc. (Lond.) 1830, p. 27.
- Anas terræ-leeuwini* Bennett, *ib.*, nom. nud. ; *id.*, Gardens and Men. Zool. Soc., p. 319, 1831 ; Esperance Bay, South-west Australia.
- Cereopsis cinerea* Brandt, Descr. Icon. Anim. Ross Nov. Aves, fasc. I., p. 6, 1836.
- Cereopsis australis* Swainson, Classif. Birds, Vol. II., p. 366, 1837 ; *id.*, Anim. in Menag., p. 219, fig. 32, 1838 ; Selby, Cat. Gen. Subg. Aves, p. 46, 1840.
- Cereopsis novæhollandiæ georgi* Mathews, Nov. Zool., Vol. XVIII., p. 446, 1912 (West Australia).
- DISTRIBUTION.** Victoria ; Tasmania ; Islands of South Australia and South-west Australia.
- Adult male.** General colour above and below ash-grey ; the head paler and inclining to white on the hinder crown ; the short scapulars have a broad dark subterminal bar, while the longer ones have a large ovate dark spot, some of the upper wing-coverts are marked in a similar way, the majority have dark shaft-lines ; bastard-wing and primary-coverts pale grey ; primary-quills grey at the base, the terminal half black with pale edges at the tips ; secondaries grey with black tips, which become narrower on the inner ones, the long innermost secondaries entirely grey ; lower back and short upper tail-coverts grey with dark central spots to the feathers, the long upper tail-coverts and tail uniform black with more or less grey at the extreme base ; the whole of the under-surface grey, becoming blackish only on the under tail-coverts. Iris pink ; feet black, legs dull pink. Total length 825 mm. ; culmen 45, wing 491, tail 160, tarsus 110.
- Adult female.** Similar to the adult male but apparently smaller. Total length 750 mm. ; culmen 44, wing 468, tail 160, tarsus 108.
- Nestling.** Top of head, back of neck, and upper-surface dark brown with two white stripes down sides of back ; white band on each side of top of head ; round eye, lores,

THE BIRDS OF AUSTRALIA.

cheeks and ears brown ; under-surface white with dusky tinge on breast, bend of winglet white ; outside of thighs brown.

Nest. "Somewhat flat, constructed of a good layer of grass, etc., lined inside plentifully with down, and usually situated on the ground amongst saltbush or tussock grass, but occasionally placed a few feet from the ground on thick scrub. Dimensions over all, about 18 inches ; inside, 9 to 10 inches across by 3 inches deep" (Campbell).

Eggs. "Clutch, four to six ; elliptical in form, sometimes rather pointed at either end ; texture of shell coarse ; surface, a trifle limy but glossy ; colour, a very thin outer creamy-white coating, on being scratched or otherwise removed reveals a white shell. Dimensions in inches : 2.88-3.03 $\times$ 2.11-2.16" (Campbell).

Length of incubation. 35 days (Sclater).

Breeding-season. June to September (MacLaine).

It is one of the strange anomalies present in the history of the Australian Avifauna that we cannot trace the investigator who brought the first specimen of this typically Australian bird back to England. For when Latham described it from a specimen in the British Museum he gave no account of its introduction into that Institution, and I have not yet succeeded in tracing the discoverer. It was not described until 1801, when Latham (*Gen. Synops. Birds Suppl.*, p. 325, pl. cxxxviii.*) proposed for it a new genus *Cereopsis*, and would not give it a corresponding vernacular name combined with goose, but called it the *New Holland Cereopsis*. Flinders, in the Introduction to his *Voyage Terra Australis*, published in 1814, shows that Bass found it before 1801, but whether Bass preserved any is very doubtful, as the following extracts suggest :—

"p. cxix. It should be remembered that Mr. Bass sailed with only six weeks' provisions, but with the assistance of occasional supplies of petrels, of seals' flesh and a few geese and black swans." This relates to a voyage undertaken in 1798. On p. cxxxv., Flinders writing of himself the same year (1798), gives us the following : "Of the birds which frequent Furneaux's Islands, the most valuable are the goose and black swan ; but this last is rarely seen here, even in the freshwater pools, and except to breed, seems never to go on shore. The goose approaches nearest to the description of the species called *bernacle* ; it feeds upon grass, and seldom takes to the water. I found this bird in considerable numbers on the smaller isles, but principally upon Preservation Island ; its usual weight was from seven to ten pounds, and it formed our best repasts, but had become shy."

Two or three other notes appear regarding this bird in Bass Straits, but on p. 83 Flinders wrote concerning Mondrain Island (which he called Goose Island), South-West Australia, in January, 1802 : "Geese and ducks were found here (at Lucky Bay), and not being very shy, some of them were killed by the shore parties. The goose was also found upon the islands, and is the

CAPE BARREN GOOSE.

same bird spoken of in the Introduction, page cxxxv., as resembling the *bernacle* goose, and frequenting Furneaux's Islands in Bass Strait." A footnote reads: "This goose is described by M. Labillardière, page 258 of the London translation, as a new species of swan." On p. 87 Flinders added, referring to Middle Island, in the same group: "Amongst the grass and upon the shores were a number of the *bernacle* goose, of which we killed nine, mostly with sticks; and sixteen more were procured in the course of the day."

After having circumvented Australia, Flinders on May 17, 1803, anchored once more at Goose Island "for refreshments," and on p. 266 we read: "In the morning (May 18) a party of men was sent to kill geese and seals upon the rocky islets to the eastward. . . . We remained here three days, cutting wood, boiling down seal oil and killing geese: but our success in this last occupation was very inferior to what it had been in January, 1802, no more than twelve geese being now shot, whereas sixty-five had then been procured."

The footnote by Flinders refers to the *Voyage in Search of La Perouse*: in the English translation of Labillardière's work I have access to I find in Vol. I., on p. 447: "On the same island there was a numerous flock of swans, several of which allowed themselves to be taken by the hand; but the rest, apprized of the danger, immediately flew away. This new species is somewhat smaller than our wild swan, and of an ash-coloured grey, a little lighter on the belly. The bill is blackish, with a tumour of sulphur-yellow at its base. The legs are slightly tinged with red."

This was published in 1800 and refers to an island off Cape Leeuwin, West Australia, visited in December, 1792. This would appear to be the first notice of this bird in print, and probably also refers to its first discovery.

In the French edition of Labillardière's work the swan is called "Cygne cendré." Vieillot, in the *Nouv. Dict. d'Hist. Nat.*, Vol. IX., p. 39, 1817, wrote: "C'est le jeune du précédent," the last word referring to *Cygnus atratus* Vieillot = *Chenopsis atrata* (Latham), the Black Swan. Then in Vol. XXIII. of the same work, p. 336, 1818, Vieillot described the present bird under the name *Anser griseus*, noting: "Cette oie fait partie du Muséum d'Histoire naturelle: elle y à été déposée par M. de Labillardière, qui, lors du voyage à la recherche de M. de Lapeyrouse, l'a trouvée à la Terre de Diémen." The probability is, however, that the bird did not come from Van Diemens Land (= Tasmania) but was the one described by Labillardière from West Australia.

MacLaine (*Emu*, Vol. III., p. 63, 1903) wrote: "A curious feature about these birds is that, although webfooted, they are never seen swimming, except when wounded or too young to fly. They are very suspicious, and one must be careful not to touch their nests or handle the eggs if wishing to obtain a clutch of goslings from them. People have taken eggs out of a nest, and

THE BIRDS OF AUSTRALIA.

finding them unfit for blowing, etc., have replaced them carefully, and happening to return the same way, have been astounded to see the parent bird breaking them with great expedition."

Again MacLaine reported (*Emu*, Vol. III., p. 191, 1904): "Cape Barren Geese are laying in large numbers this season. I have seen as many as 30 nests on two islands. Last year it was almost impossible to get any eggs, which led one to think that the birds had departed elsewhere to breed, so we must attribute it to nature, which often ordains that both the animal and vegetable kingdom should be less prolific in some seasons than in others."

Mr. Frank S. Smith has sent me the following note: "Although in a general way Cape Barren Geese may be said to all leave Victoria (I am speaking of the flocks that come to Victoria from the C.B. Islands) at the end of summer, returning to the islands, there are almost a few birds which remain here. I got the manager of a station where they always visit to watch particularly, and he writes me that the few that remain include wounded birds. The non-migrating birds spend the winter on the western plains, but appear quite out of their element and miserable, and when their mates come back from the islands at the end of spring, these stationary birds meet them with great excitement. So far as is known, these non-migrating birds never breed here. Of course it is proverbially difficult to prove a negative, but I fancy their nests would have been found or the young birds seen. I have no record of either. This goose is a common inhabitant of the western plains of Victoria, of course in the summer only, to which it migrates from its island homes. It commences its migration to the mainland of Victoria, in the end of September, and they keep coming until the middle of December. In the earlier lots, it is easy to distinguish the young birds from the old, but the distinction soon dies away. The geese leave on the return journey towards the end of March. Campbell, and all others whom I have seen, persist in referring to it as being of limited numbers. In one day, however, I counted two flocks, feeding on a bark, in which there were 124 and 136 birds respectively. This was in February, 1907. In the summer (January) of 1906, I saw hundreds of the birds sprinkled (for over a mile) along a moist depression, a sort of dry watercourse. Both of these sights were seen near Streatham, in the heart of the plains. I have also seen smaller flocks on the banks of lakes and dams. So far as I know, these plains, from Geelong to Hamilton, are the sole Victorian habitat of the bird. I have noticed that the bird is curiously averse to swimming, and I have never seen wild birds doing so. I have seen them standing in the water, and playing in it, but always with their feet on the bottom. But I have seen wounded birds swim freely."

CAPE BARREN GOOSE.

Mr. J. W. Mellor has contributed this account: "These peculiar geese are now getting scarce in Australia: in South Australia and some of the other states they have been totally protected and are now breeding slowly. They prefer to carry on their breeding on quiet out-of-the-way islets, as they are somewhat wary birds and easily disturbed in the breeding-season; their nest is composed of pieces of stick, plants, etc., selected from around, the situation being in the lee of some low bush, which acts as shelter from the stormy winds which blow in the exposed situations selected as their home. The nest is always well lined with soft down plucked from the breast of the sitting bird, and when she leaves the nest for feeding, the eggs are well covered with this warm material, which keeps their temperature up for a considerable time. The clutch is from 4 to 5 in number; the color is white and the shell has a certain amount of gloss on the surface, on account of the finer texture of the shell than that of the common barndoor geese. They are early layers, starting to mate in April and May, and laying in June: the young are fully fledged and away by August. I have seen mobs of old and young birds on Lake Albert, South Australia, in October, which have come from the islands off the south Australian coast. While on the Royal Australasian Ornithologists' eighth congress expedition in the 'S.S. Manawatu' to the islands of Bass Strait I saw these birds on the various lonely small islands visited where they breed, notably on Rhodent Island, off Flinders Island, and on one of the islets of the Pascoe Group, where the old nests were seen, and the geese seen flying about Dec. 3, 1908. On Storehouse Island, off Babel Island, we saw several Cape Barren Geese breeding: one lot had quarter-grown young, with the down still on, while yet another brood could all but fly, and when frightened took to the sea, and swam out on the ocean to avoid capture; this was Dec. 4, 1908. We also saw them on the Glennies Islands off Wilson's Promontory, Victoria; the young were barely able to fly on Dec. 7, 1908. The wide dates of fully fledged young, I think, varies on account of the birds often laying two clutches of eggs in the season, as when an early lot of eggs are taken they will lay again. I have kept the birds in semi-captivity for years and find this the case. They are extremely pugnacious when breeding, and should one pair come in contact with another pair, the old ganders have a set to in good earnest, so that they keep to their own little quarters; in captivity I find that only one pair must be kept in an enclosure. The young in down are pretty little balls of grey fluff, with several longitudinal lines of black down the back; their legs are of a leaden colour when young and change to the full pinkish-red of the old birds at about 12 months. In South Australia they breed sparsely on the small islands in Spencer's Gulf, also in the open ocean side of Eyre's Peninsula on the small rocky islands where they can breed quietly. The

THE BIRDS OF AUSTRALIA.

note of the gander is a harsh cackling screech, while that of the goose is more of a deep guttural note somewhat like the grunting of the pig: this is especially noticeable when the male bird is 'talking,' and his mate replies by putting her head down to the ground and 'talks' back to him."

A note from Captain S. A. White confirms the preceding, while Mr. Frank Littler writes that although "vigorously prosecuting inquiries among masters of river and coastal traders, one and all have never seen this species on the Tamar, Tasmania."

Mr. T. P. Austin (North, *Austr. Mus. Spec. Cat.*, no. 1, Vol. IV., p. 60, 1913) writes: "A few years ago Cape Barren Geese (*Cereopsis novæhollandiæ*) were rather numerous throughout the western district of Victoria, and were always a favourite bird with the sportsmen. To shoot them, however, their habits had to be thoroughly understood; in the first place, in their native state, they are one of the wildest of Australian birds; secondly, they are very seldom seen anywhere near cover from which they could be shot. When they fly it is usually in the same direction each time, and at no great height, so it is only those who know where to find them and where they are most likely to fly who can shoot them."

Mr. G. A. Kearnland (*ib.*) stated: "Around the coast of Western Australia they are often seen flying from adjacent islands to the mainland. At Green Island they breed freely, laying from three to five eggs, and rearing two broods in a season."

The bird figured and described is a male, collected at North Twin Peaks Island in the S.E. of West Australia on the 6th of May, 1909, and is the type of *C. n. georgi*.

GENUS—CHENONETTA.

CHENONETTA Brandt, Descr. Icon. Anim. Ross Nov. Aves,
fasc. I., p. 5, 1836 Type *C. jubata*.

CHLAMYDOCHEN Bonaparte, Comptes Rendus Sci. (Paris),
Vol. XLIII., p. 648, 1856 Type *C. jubata*.

Also spelt—

Chlamidochen Bonaparte, Ann. Sci. Nat. (Paris), 4th Ser., Zool., Vol. I., p. 151, 1854; nom. nud.

Chlamydauchen Schlegel, Mus. Pays-Bas, Anseres, Vol. VI., p. 97, 1866.

Chlamlydochen Ramsay, Tab. List Austr. Birds, p. 22, 1888.

MEDIUM-SIZED Anseriform birds with short bill, short maned neck, long wings, medium tail, short legs and feet.

The bill is short and of medium depth for this group, of about the same length as the head; the nostrils are comparatively large ovals placed mid-way down the culmen, the culmen ridge not well differentiated; the nail is not distinctly marked off, spatulate not pointed.

The serrations on the inner edge of the upper mandible are few in number, placed rather distantly. The under mandible is flat, broadish, with flattened broad nail; the rami are not prominent, enclosing a triangular space which is half feathered.

The neck is short and there is a patch of elongated feathers on the hind neck.

The wings are long, the first primary shorter than the second, which is longest, but longer than the third.

The tail is much less than half the length of the wing, and rounded. The metatarsus is reticulate throughout, equal to half the length of the tail and slightly longer than the middle toe. The toes are fully webbed, the hind toe short, narrowly lobed.

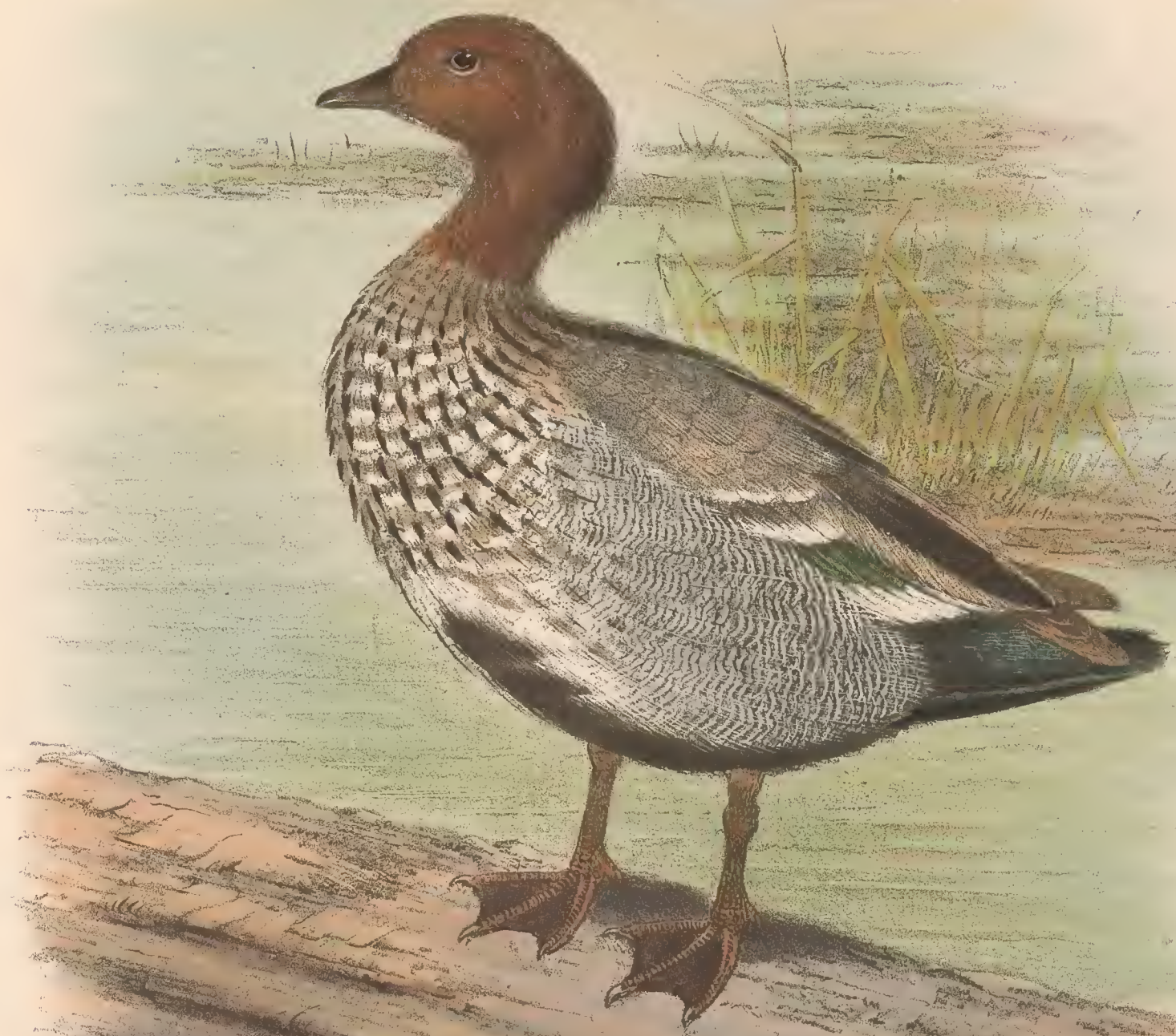
The extraordinary nature of this form may be gauged by the fact that as the vernacular names chosen for its recognition two appear, viz., Wood-Duck or Maned Goose. No other Australian bird boasts of such an anomalous nomenclature.

Gould wrote, p. 356: "Although I have applied the trivial name of goose to this bird, it has but little relationship to the typical member of the genus *Anser*, none of which, as stated in the introduction, exist in Australia, nor, so far as I am aware, in any of the Polynesian Islands."

THE BIRDS OF AUSTRALIA.

Salvadori, in the *Catalogue* of Birds in the British Museum, Vol. XXVII., included it in a subfamily *Chenonettinæ*, a connecting subfamily between the Anserine and Anatinae. This subfamily approached the Anatinae in having a narrow lobe to the hind toe, and was differentiated from that by the "short and goose-like bill." In his *Chenonettinæ* he included the species of the genus *Chloëphaga*, which is confined to South America, but also added *Cyanochen*, a monotypic Abyssinian form. The acceptance of the former would be consistent with an antarctic distribution, but the presence of *Cyanochen* in the group would invalidate such a premise. I would suggest that anatomical research may confirm the alliance of *Chloëphaga* and *Chenonetta*, but if so it would also necessitate the removal of *Cyanochen* to another place.

Shufeldt (*Emu*, Vol. XII., p. 209, *et seq.* 1913) does not touch upon this, but notes apparent relationship of *Chloëphaga* and *Chenonetta*, and figures on pl. xxix. bones from a subfossil specimen found in a cave in New Zealand as those of *Chenonetta jubata*. While the specific identification of the New Zealand bones may be questioned, there can be little doubt as to the former existence in New Zealand of a form of this group, thus once more linking up South America, New Zealand and Australia.



H. Grönvold, del.

Witherby & Co.

$\frac{1}{3}$
CHENONETTA JUBATA.
(WOOD-DUCK).

CHENONETTA JUBATA.

WOOD-DUCK OR MANED GOOSE.

(PLATE 205.)

ANAS JUBATA Latham, Index Ornith. Suppl., p. lxix., 1801 ; New South Wales.

Hawksbury D(uck) Latham, Gen. Synops. Birds Suppl., Vol. II., p. 358, fig. in frontispiece, 1801 ; *id.*, Gen. Hist. Birds, Vol. X., p. 357, 1824.

Anas jubata Latham, Index Ornith. Suppl., p. lxix., 1801 ; Vieillot, Nouv. Dict. d'Hist. Nat., Vol. V., p. 110, 1816 ; Dumont, Dict. Sci. Nat. (Levrault), Vol. VI., p. 388, 1817 ; Brandt, Descr. Icon. Anim. Ross. Nov. Aves, fasc. I., p. 5, 1836.

Anas subata (errore) Vieillot, Tabl. Ency. Meth. Orn., Vol. I., p. 358, 1820.

Bernicla jubata Stephens, in Shaw's Gen. Zool., Vol. XII., pt. II, p. 63, 1824 ; Eyton, Monogr. Anatidæ, p. 87, 1838 ; Gray, Genera Birds, Vol. III., p. 607, 1844 ; *id.*, List Birds Brit. Mus., pt. III., p. 128, 1844 ; Gould, Birds Austr., Vol. VII., pl. 18, 1845 ; Reichenbach, Synops. Av. Natat., pl. 98, figs. 944-5, 1845 ; pl. 99, figs. 2352-3, 1850 ; Hartlaub, Erst. Nachtr. Vögelsamml., p. 19, 1846 ; Stokes, Discov. in Austr., Vol. I., App., p. 483, 1846 ; Leichhardt, Journ. Overl. Exped. Austr., p. 147, 1847 ; Sturt, Narr. Exped. Centr. Austr., Vol. II., App., p. 54, 1849 ; Lichtenstein, Nomencl. Av. Zool. Mus. Berol., p. 100, 1854 ; Selater, Proc. Zool. Soc. (Lond.) 1864, p. 587 ; Müller, *ib.*, 1869, p. 280 ; Eyton, Synops. Anatidæ, p. 34, 1869 ; Diggles, Birds Austr., Vol. II., pl. 110, 1872 ; Pelzeln, Ibis 1873, p. 46 ; Selater, Proc. Zool. Soc. (Lond.) 1880, p. 504 ; Legge, Papers Proc. Roy. Soc. Tasm. 1886, p. 244, 1887.

Anser lophotus Brandt, Descr. Icon. Anim. Russ. Nov. Aves, fasc. I., p. 5, 1836 (New South Wales).

Chlamydochen jubata Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 648, 1856 ; Gould, Handb. Birds Austr., Vol. II., p. 354, 1865 ; Ramsay, Ibis 1866, p. 335 ; Sundevall, Meth. nat. Av. disp. Tent., p. 146, 1872 ; Ramsay, Proc. Zool. Soc. (Lond.) 1877, p. 345 ; North, Austr. Mus. Cat., no. 12, p. 336, 1890 ; *id.*, Trans. Roy. Soc. South Austr., Vol. XXII., p. 189, 1898 ; White, Emu, Vol. XIII., p. 124, 1914 ; Macgillivray, *ib.*, pp. 134, 147, 1914.

Anser jubatus Lichtenstein, Verzn. samml. Neuholl., p. 6, 1837 ; Schlegel, Mus. Pays-Bas, Anseres, Vol. VI., p. 97, 1866 ; Giebel, Thes. Orn., Vol. I., p. 372, 1872.

Chenalopex lophotus Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 649, 1856.

Chlamydauchen jubatus Schlegel, Mus. Pays-Bas, Anseres, Vol. VI., p. 97, 1866.

Sarkidiornis (*Chenonetta*) *lophotus* G. R. Gray, Handl. Gen. Sp. Birds, pt. III., p. 74, 1871.

THE BIRDS OF AUSTRALIA.

Branta (Chlamidochen) jubata *id.*, *ib.*, p. 76 ; Ramsay, Proc. Linn. Soc. N.S.W., Vol. II., p. 200, 1878 ; *id.*, Tab. List Austr. Birds, p. 22, 1888.

Anser (Brenthus) jubatus Reichenow, Orn. Centralbl. 1882, p. 37 ; *id.*, Vögel. Zool. Gart., p. 65, 1882.

Chloephaga jubata Rogeron, Bull. Soc. Acclim. 1889, pp. 478-485, pp. 569-576 (with two figs.).

Chlamydochen jubatus Heine and Reichenow, Nomencl. Mus. Heine Orn., p. 342, 1890.

Branta jubata Hartert, Katal. Vögels. Mus. Senckenb., p. 227, 1891.

Chenonetta jubata Salvadori, Cat. Birds Brit. Mus., Vol. XXVII., p. 140, 1895 ; Hall, Key Birds Austr., p. 106, 1899 ; Campbell, Nests and Eggs, Austr. Birds, Vol. II., p. 1023, 1901 ; Hill, Emu, Vol. II., p. 167, 1903 ; Hall, Key Birds Austr., 2nd ed., p. 106, 1906 ; Sharpe, Hist. Coll. Nat. Hist. Brit. Mus., Vol. II., p. 152, 1906 ; Berney, Emu, Vol. VI., p. 156, 1907 ; Batey, *ib.*, Vol. VII., p. 14, 1907 ; Hill, *ib.*, p. 23 ; Austin, *ib.*, p. 78 ; Mathews, Handl. Birds Austral., p. 35, 1908 ; Mattingley, Vict. Nat., Vol. XXV., p. 65, 1908 ; Hall, Emu, Vol. IX., p. 79, 1909 ; Littler, Handb. Birds Tasm., p. 217, 1910 ; Mathews, Nov. Zool., Vol. XVIII., p. 236, 1912 ; North, Austr. Mus. Spec. Cat., no. 1, Vol. IV., p. 62, 1913 ; Hill, Emu, Vol. XII., p. 242, 1913 ; Mathews, List Birds Austr., p. 88, 1913.

DISTRIBUTION. Australia ; Tasmania.

Adult male. Upper-back, scapulars, and wing-coverts pale grey, the outer webs of some of the scapulars velvety black as well as the edges of some of the inner ones ; some of these dark feathers have a beautiful green metallic lustre ; lower back, rump, upper tail-coverts, and tail deep glossy black ; lesser upper wing-coverts pale grey becoming darker on the greater coverts, which are broadly tipped with white ; primary-coverts and quills dark brown, the latter white on the basal portion of the inner webs ; secondary-quills white with grey on the inner webs and metallic emerald-green on the outer webs ; the white tips of the secondaries as well as those of the greater coverts form a double wing-bar, enclosing the metallic green speculum ; head and neck all round dark chestnut, becoming darker and inclining to blackish on the nuchal crest or mane ; a small white line immediately below the eye ; mantle dark grey with a dark spot on each margin of the feathers becoming paler on the sides of the neck ; fore-neck and breast white, each feather crossed by two, and sometimes three, dark brown bars which gives a coarsely speckled appearance ; sides of the body pale grey with fine wavy cross-bars ; middle of the abdomen and under tail-coverts deep black ; axillaries and under wing-coverts pure white ; outer edge of wing chiefly grey. Bill dark glossy green, lower mandible shaded with red at the tip ; iris very dark brown ; feet dark greenish-grey. Total length 473 mm. ; culmen 30, wing 273, tail 93, tarsus 51.

Adult female. Differs from the adult male by the paler chestnut, the minutely speckled streaks above and below the eye and on the chin and upper throat ; the speckling on the breast more brown and not so vivid, the almost entire absence of the grey and wavy black bars on the sides of the body and the abdomen and under tail-coverts being white instead of black. Bill dark glossy green, lower mandible greyish flesh-colour, blackish-grey at tip ; iris very dark brown ; feet French grey. Wing 278 mm. ; culmen 28, tail 93, tarsus 50.

Immature male. Distinguished from the adult male chiefly by having the white speckling on the lores, superciliary line, sides of face and chin, and the mixture of white and black on the upper abdomen.

WOOD-DUCK OR MANED GOOSE.

Nestling. Upper-surface brown, head darker; a white spot on each side of the back near the tail; white bar on the wing; under-surface white, brownish on the sides and lower throat; chin white; from the bill a white stripe above and below the eye; a dark brown one from the bill through the eye, and another of the same colour below the white one; feet greenish.

Nest. The nesting-site is a hole in a tree lined with down.

Eggs. Clutch, six to twelve; creamy white, slightly glossy with smooth surface. Axis 60 mm., diameter 39.

Breeding-season. August to January; June (North).

THIS is another Australian Duck Latham named for the first time in his Supplement, Vol. II., to the *Gen. Synops. Birds*; this time the male was described from Latham's own collection, but he refers to the drawings of Mr. Lambert for a variation. Watling has two pictures, but his only notes read: "This species of duck is found at Hawkesbury; sometimes perching," and "This is the only Duck of this kind ever seen. May."

Mr. E. J. Christian has given me the following note: "This bird was very plentiful last autumn and winter (1907), but whether on account of the extreme dryness it has not been here (Victoria) since. They build up in tall gums, sometimes to a height of 40 feet in a hollow. I have always found that they are birds who seem to prefer the night or early morning to the daytime. To hear them on a dark morning in winter the cry is very deceptive; it is a 'mow' long drawn out and something like the cry of a cat. This call is used frequently. They are one of the hardest birds to steal upon, as they always post a sentry who is ready at any moment to give the alarm. I have often tried to steal upon them to watch them, and it was only once or twice that I have been successful. When feeding in the creek one or two always stand on a horizontal bough of a dead tree; the bough has to be a very thick one so that they can retain their balance. One day I saw a flock settle on the creek and it took me over an hour to get up to them only 100 yards away; there were 22 of them; they swam about the tank, but most of them stood in a lazy attitude in the mud, giving vent now and again to their peculiar cat-like call. The calls grew louder as they always do when they fear an enemy is near, and off they went. Another time I got up to a flock when a *Notophoyx novæ-hollandiæ* came and being taken by surprise called out his hardest, and the ducks of course went. As a rule they are quieter during the day than at night. . . . This bird did not return till June 24, 1908; the extreme drought had kept them away since they left in the winter of 1907. Oct. 5. Pair have 9 young. Oct. 26. Noticed 8 young swimming in the creek."

This account should be contrasted with that given by Gould over sixty years earlier: "During the period I had the privilege of observing the birds of Australia in a state of nature, no one of the natatorial forms interested me

THE BIRDS OF AUSTRALIA.

more than the present species. . . . During the early days of the colony of New South Wales, it was very common on the rivers near Sydney, particularly on the Hawkesbury : at the present time it is sometimes seen there, and is still numerous on the Hunter and other rivers towards the interior limits of the colony. In South Australia it is one of the commonest of the water birds, frequenting the brooks of the interior. . . . It presents a very pleasing appearance while flying up and down the brooks in flocks of from six to thirty in number, and is equally interesting when perched in small companies on the branches of fallen trees which have found a resting-place in the beds of the rivers and waterholes, or when sitting on the topmost branches of the high gum-trees in the midst of the woods. Its flesh is excellent, and not unfrequently forms an acceptable repast for the settled colonist and the weary traveller. It frequently utters a loud barking note so unlike the voice of any goose, as at once to excite the attention of any person who may be traversing the parts of the country it inhabits. *I found it to be tolerably tame in disposition, which circumstance enabled me to procure numerous examples without difficulty.*"

I have italicised this last sentence to show the difference in habits through sixty odd years' persecution.

Captain S. A. White has written me : "These pretty little geese prefer the inland waters to those of the coast, and are to be met with in large flocks on the upper reaches of the Murray. They feed on the river banks on grasses and other vegetation, fond of perching on dead trees, and make a sharp barking cry. Nest in hollow spouts and carry the young on their backs to the water."

Mr. Sandland notes : "May often be seen during a very wet winter at Balah, South Australia."

Mr. J. W. Mellor's contribution is most interesting : "This pretty little goose, commonly called the "Wood-Duck," is not nearly so plentiful now as in the early days ; it is hunted and shot too frequently and will need protection in the near future. Its haunts amongst the old dead gums are too often destroyed. I have seen them in the earlier times perched on the old gum-trees that have fallen into the river and are practically submerged, and in this situation they look strange ; they delight to fly along the large rivers such as the Murray, and alight on some jutting point of land and dabble at the water's edge. They also like the sloping short green banks of the stream, where they eat the grass, for like the other members of the geese family, the grass forms a large portion of their feed. They always lay in hollow trees, forming a nice cosy nest of down and feathers, where they lay 6, 8, and 10 eggs, the former numbers more often forming the clutch. It is said that the old bird takes

WOOD-DUCK OR MANED GOOSE.

the young up in her bill and flies with it to the ground when the young are hatched so as to prevent it from being hurt in the fall from the nest to the earth. Such is not the case as far as my observations are concerned, and I have kept the birds in semi-captivity for years, and have been successful in rearing them and watching their actions while breeding. I always found that the young 'got out' when the nest was slanting sufficiently inside, and also when it was wooden, even if the walls of the nest were perpendicular, the young being able to stick their little claws into the wood, and scramble out, the fall to the ground doing no damage to such little light balls of soft down, of no comparative weight at all. But to test the matter well I substituted a smooth tin for the nesting-place on one occasion, and in another case a well-glazed drain-pipe, putting these up to act as a hollow limb, and in both cases the young ones died in the nest after being hatched out successfully: had there been anything reliable in the theory of the birds taking them like a cat, they could have done so just as easily in these cases as in other nests, so that I think that I have proved conclusively that the theory is like many others that one often hears, merely origination from some old bushman's suppositions. Like other geese, the gander does not sit, the goose doing the whole of the incubation. Their call is a harsh little cracking noise uttered in the throat, the head being put erect, and the bill being thrown out: the goose has a note resembling the note 'cuck-cuck-cuck' repeated quickly and often, especially when running about her mate and 'talking' to him."

Mr. T. P. Austin (North, *Austr. Mus. Spec. Cat.*, no. 1, Vol. IV., p. 64, 1913) states: "The Maned Goose (*Chenonetta jubata*) is usually plentiful throughout the district, especially after the breeding-season is finished, when they congregate in large flocks and give good shooting to the sportsmen. They, however, take more shooting than any of the ducks, not that they are a faster bird on the wing, but because they are so much more difficult to kill. To have good results in shooting them one requires No. 2 shot, whereas for other duck shooting I prefer No. 4 and 6 shot. Its call-note is rather remarkable, being loud and clear, and can be heard a long way off, especially when flying. They do not call out conspicuously when flying in flocks, but just one bird at a time, and at intervals of about ten seconds; sometimes they fly silently, especially in open country. When flying low through timber, one is at least calling out, and from watching my pet ones I noticed it was always the female which did so; the males are very silent. Although they are mostly found near water, seldom in it, more often upon a log or on a nice green patch of grass, and yet again upon the bank of a dam, where there is nothing growing. When disturbed they usually fly round a few times, then settle either in dead trees or in water; if the latter, they give a few low cackling grunts and then swim for

THE BIRDS OF AUSTRALIA.

the dry land. Long before the breeding-season they pair off, and one pair will occupy the same locality for some weeks, then for a while only one bird will be seen, which has become very tame, usually the male, although both birds help with the incubation. Where they breed in great numbers one pair of old birds will sometimes take possession of several families. At Wambiana Station, on the Macquarie River, my brother and self saw a pair of old birds with over fifty young; we tried to count them, but could not, but were sure there were over fifty, and we could easily distinguish four different clutches, probably more. They prefer a dead tree to nest in, but are often found nesting in living Red Gums. As a rule they go a little distance away from the water for nesting purposes, and not in a tree overhanging water, such as other species of ducks prefer. I found one sitting upon eight eggs in a dead Box-tree near Narromine, quite two miles from the nearest water; many people might think the young from a nest so situated would never live to reach water, but my own opinion is they do, and very quickly; young Ducks, even though only just out of the nest, are wonderfully active on their legs, and are most difficult to catch, either upon dry land or in water."

Mr. Tom Carter states: "Have observed this species in the North-west and extreme South-west."

Sturt (*Narr. Exped. Centr. Austr.*, Vol. II., App., p. 54, 1849) observed: "There are two varieties of this beautiful goose, one bird being considerably larger than the other, but precisely the same in plumage. In the colony they are called the wood duck, as they rest on logs and branches of trees, and are often in the depth of the forest. They have an exceedingly small bill, characteristic of their genus, and a beautifully mottled neck and breast, the head and neck being a light brown. The smaller species is very common all over South-eastern Australia, but the larger bird is more rare. Three only were shot during the progress of the Expedition. Their range did not extend beyond 28°."

Berney's notes read (*Emu*, Vol. VI., p. 156, 1907): "One of our commonest ducks during the summer, but it mostly appears to avoid us during the months of April to July inclusive. I have only come across a single instance of its nesting in the district (Queensland): two ducklings in mottled brown down were captured at the end of March, 1904, and were successfully reared by hand. They are no favourite with the gunner, being very watchful and wary, besides being deemed inferior eating to the Black Duck or Teal. They weigh about a pound and a half. They are generally rather exclusive, not mobbing with other species of duck. Fifty or sixty would be the most I ever saw together, but this is not a favourable locality for this class of bird; we have no large sheets of water or swamps to attract them."

WOOD-DUCK OR MANED GOOSE.

Hall's (*Emu*, Vol. IX., p. 79, 1909) conclusions are: "This is a pasture feeder. I found it during this season to be very destructive of specially-grown crops. The first crop (18 acres) of rice grown in Victoria for commercial purposes was completely destroyed by it. At other times it appears to feed on grass fields. It is a tame bird, and will even approach one, from an inquisitive turn of mind, the whole flock gradually getting nearer. It associates in large flocks."

The bird figured and described is a male, collected at Braidwood, New South Wales, in June, 1891.

GENUS—DENDROCYGNA.

DENDROCYGNA Swainson, Classif. Birds, Vol. II., p. 365,

1837 Type *D. javanica*.

Also spelt—

Dendrocyna Selater, Proc. Zool. Soc. (Lond.) 1880, p. 508.

Dendronessa Wagler, Isis 1832, p. 281 (not *Dendronessa*

Swainson, 1831) Type *D. javanica*.

MEDIUM-SIZED Anatine birds with Anatine bill, long neck, long wings, short tail, very long legs and long toes.

The bill is long, longer than the head, with the culmen ridge ill-defined : on the anterior portion scarcely differentiated from the sides, which are somewhat swollen and expanded. Nostrils are small ovals placed high up near the base of the culmen, a shallow obsolete groove being present. The nail overhangs the under mandible with a rather pointed tip. The serrations on the inner edge of upper mandible are well marked.

The under mandible has a well-defined nail, the rami almost parallel enclosing a narrow unfeathered groove ; serrations obsolete but visible.

The wing has the second and third primaries equal, little exceeding the fourth, whilst the first is less than the fifth.

The tail is short, only about one-fourth the length of the wing, the feathers softish, almost obscured by the long upper tail-coverts.

The legs are long, a long exposed tibia being present ; the metatarsus is covered with reticulate scales, and is about equal to the tail in length and longer than the culmen.

The toes are long and fully webbed ; the middle toe without nail exceeds the metatarsus and also the tail in length.

The hind toe is long and narrowly lobed.

This and the next genus are representatives of the *Anatidæ* known as Tree-Ducks ; they are easily recognised by their long stout legs, with long exposed tibia and long hind toe. Their peculiar attitude when perched, with long thin neck and very long legs, is unmistakable.

Shufeldt (*Emu*, Vol. XII., p. 235, 1913) has intimated that : “ Recently, I have completed a contribution on the genus *Dendrocygna*, examining the members of the entire genus and two species osteologically. My examination

DENDROCYGNA.

of them has led me to believe that they represent a distinct subfamily of themselves, and this subfamily I have duly characterised in the afore-said work, which will appear in due course. (p. 211.) This memoir, when published, will, on thirty-five plates, give figures of skulls and other parts of the skeleton of a large number of the *Anseres* from various regions of the world."

As at the same place Shufeldt has considered *Anseranas* and *Cereopsis* as only of subfamily value, it can be deduced that these Tree-Ducks show important anatomical differences correlative with their superficial distinguishing features.

Although Gould in his *Handbook* sank *Leptotarsis* as a synonym of *Dendrocygna*, and Salvadori in the *Catalogue* of Birds in the British Museum did not recognise the former genus, I find differential characters quite as pronounced as have been made use of in maintaining other Anatine genera. As a matter of fact, Salvadori has admitted colour to be the chief factor in recognising some Anatine genera.

I find *Leptotarsis* (which I have re-named *Ctenanas* on account of a prior *Leptotarsus*) to differ in its shorter deeper differently-formed bill, its longer wings with much longer hard-feathered tail, which is much longer than the metatarsus, and the latter is exceeded by the middle toe; these proportions are reversed in *Dendrocygna*.

DENDROCYGNA JAVANICA AUSTRALIS.

WHISTLING DUCK.

(PLATE 206.)*

DENDROCYGNA ARCUATA (AUSTRALIS) Reichenbach, Nov. Synop. Av., no. iv., p. 4, 1850 ;
Port Essington, Northern Territory.

Dendrocygna arcuata (not Horsfield) Gould, Birds Austr., Vol. VII., pl. 14, 1846 ; Stokes,
Discov. in Austr., Vol. I., App., p. 483, 1846 ; Reichenbach, Vögel. Neuholl., p. 190,
1851 ; Ramsay, Ibis 1865, p. 87 ; Diggles, Birds Austr., pl. 114, fig. 2, 1870 ; North,
Vict. Nat., Vol. XIX., p. 35, 1902 ; Le Souëf, *ib.*, p. 68 ; Hartert, Nov. Zool.,
Vol. XII., p. 205, 1905 ; Mathews, Handl. Birds Austral., p. 35, 1908 ; *id.*, Emu,
Vol. X., p. 106, 1910 ; North, Austr. Mus. Spec. Cat., no. 1, Vol. IV., p. 66, 1913 ;
Macgillivray, Emu, Vol. XIII., p. 147, 1914.

Dendrocygna arcuata (australis) Reichenbach, Synops. Av. Natat., pl. 91, figs. 2650-51,
1850.

Dendrocygna arcuata gouldi Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 649,
1856 ; nomen. nudum.

Dendrocygna gouldi Gould, Handb. Birds Austr., Vol. II., p. 374, 1865 ; Ramsay, Proc.
Zool. Soc. (Lond.) 1877, p. 346 ; Stone and Mathews, Austral Av. Rec., Vol. I.,
p. 143, 1913.

Dendrocygna vagans Ramsay, Proc. Zool. Soc. (Lond.) 1868, p. 388 ; Gray, Handl. Gen.
Sp. Birds, pt. III., p. 71, 1871 (part) ; Ramsay, Proc. Linn. Soc. N.S.W., Vol. I.,
pp. 77, 195, 217, 386, 1876-77 ; Vol. II., p. 200, 1878 ; Vol. III., p. 301, 1878 ;
Vol. IV., p. 102, 1879.

Dendrocygna vagans Selater, Proc. Zool. Soc. (Lond.) 1880, pp. 508-10 ; Ramsay, Tab.
List Austr. Birds, p. 22, 1888 ; North, Austr. Mus. Cat., no. 12, p. 339, 1890.

Dendrocygna arcuata (part) Salvadori, Cat. Birds Brit. Mus., Vol. XXVII., p. 153, 1895 ;
Hall, Key Birds Austr., p. 106, 1899 ; Campbell, Nests and Eggs Austr. Birds,
Vol. II., p. 1025, 1901 ; Kilgour, Emu, Vol. IV., p. 38, 1904 ; Hall, Key Birds
Austr., 2nd ed., p. 106, 1906 ; Berney, Emu, Vol. VI., p. 156, 1907 ; Hall, Emu,
Vol. IX., p. 78, 1909 ; Broadbent, *ib.*, Vol. X., p. 245, 1910 ; Hill, *ib.*, Vol. XII.,
p. 254, 1913.

Dendrocygna javanica gouldi Mathews, Nov. Zool., Vol. XVIII., p. 237, 1912 ; *id.*, List
Birds Austr., p. 89, 1913 ; *id.*, Ibis 1914, p. 107.

* The Plate is lettered *Dendrocygna gouldi*.



H Goodchild. del

Witherby & Co.

$\frac{1}{2}$
DENDROCYGNA GOULDI.
(WHISTLING DUCK).

WHISTLING DUCK.

Dendrocygna javanica peroni Mathews, Austral Av. Rec., Vol. I., p. 86, 1912; Fitzroy River, North-west Australia.

DISTRIBUTION. North-west Australia; Northern Territory; Queensland; New South Wales; Victoria.

Adult male. Back and scapulars black, the feathers margined with chestnut; lesser upper wing-coverts bright chestnut; median and greater coverts black, some of which are margined with chestnut on the inner webs; bastard-wing, primary-coverts and quills uniform black; crown of head and a narrow line down the hind-neck dark brown; sides of the face, throat, and sides of neck pale rufous; lower hind-neck and fore-neck rufous barred with black; abdomen and sides of body uniform chestnut, the long flank feathers margined with black and fringed with rufous, or chestnut, on the inner web; vent and under tail-coverts buffy-white, the former streaked with brown; axillaries and under wing-coverts dark brown; lower back, rump, and upper tail-coverts black; sides of the rump and some of the small upper tail-coverts buffy-white. Bill black; iris brown; tarsi and feet leaden brown. Total length 470 mm.; culmen 47, wing 210, tail 54, tarsus 51.

Adult female. Similar to the adult male.

Immature. Differs chiefly by its dull white throat, paler breast and lower hind-neck, the white on the sides of the rump, and the white under tail-coverts.

Flapper. Darker above with the edges of the feathers deep buff and lacks the barred appearance on the lower hind-neck; lower fore-neck uniform rufous brown; sides of the breast rufescent; middle and abdomen with feathers with white centres.

Nest. Placed in the grass, without lining.

Eggs. Clutch, 10 to 15; creamy-white, rather like those of the former, slightly glossy and pointed at both ends. Axis 51 mm., diameter 35.

Breeding-season. February, March, May, November (North).

THE life-history of this bird, as that of almost every other Australian Duck, is practically unknown. Mr. J. P. Rogers notes result as recorded in the *Ibis* 1914, p. 107: "A few were seen (at Melville Island) from October to December. On the 10th of January, 1912, a large flock passed over." I make this remark as the reviewers have pointed out that through an extraordinary oversight I omitted to record that the collection reported upon in that paper was made by Mr. J. P. Rogers, and that all the field notes there printed were from his pen.

So little has been made known of the habits of this species that it is necessary to reproduce Gould's account prepared from Gilbert's notes: "During the months of September, October, November and December, the Whistling Duck assembles in vast flocks on the lakes around the settlement at Port Essington; the lagoons and water at that season of the year are so shallow, that this and many other species of the Duck tribe are enabled to wade among the herbage and procure an abundant supply of food. Gilbert states that, on the approach of man or the report of a gun, this and the other species in company with it rise altogether, but that each species separates itself into a distinct flock during the act of rising. While

THE BIRDS OF AUSTRALIA.

on the water it is quite silent, emitting no kind of noise; but all the time it is on the wing it gives utterance to a peculiar whistle. The stomach is extremely muscular, and the food consists of small fish and aquatic plants."

A word of warning must be given with regard to the vernacular name of this Duck: it is now universally known as Whistling Duck, but the earlier investigators apparently applied that name to other species. This species was not known from Australia until after 1830, so that I noted with surprise that Sharpe (*Hist. Coll. Nat. Hist. Brit. Mus.*, Vol. II., p. 244, 1906) wrote that on the twenty-fifth day's sale of the Bullock Collection, the 10th June, 1819, Lot 3 was The Whistling Duck of New Holland, and this was purchased by Professor Temminck for £1.

My surprise deepened when referring to the *Trans. Linn. Soc. (Lond.)*, Vol. IV., p. 103, 1798, where Latham described *Anas semipalmata*. I observed that of this bird Latham wrote: "It was observed sometimes to perch on trees, in the manner of the *Whistling Duck*." If this note referred to this species this would be the earliest record of its occurrence in Australia, but a clue was given to a complication by the note of Sturt's (*Narr. Exped. Centr. Austr.*, Vol. II., App., p. 56, 1849) where he wrote of *Malacorhynchus membranaceus*: "It is very common on most of the Australian creeks and streams and is called the Whistling Duck." As, however, the little Pink-eared Duck is not famed, as far as I know, for perching on trees, we cannot with certainty attach Latham's note to this bird.

It is probable that still other species of Ducks were known as Whistling Ducks to the earliest settlers.

Berney notes (*Emu*, Vol. VI., p. 156, 1907) of North Queensland: "A rare visitant, of whose visits I have only three records—February, June and December. Doubtless it is at times overlooked, and put down as *D. eytoni*, but it is undoubtedly rare."

Hall (*Emu*, Vol. IX., p. 78, 1909) writing of Victoria, states: "Evidently a rare species in this locality, for during the last 8 or 9 years only one flock has been seen (50 birds). About thirty years ago they were numerous, and it was a common sight to find them camped upon the dead limbs of the red gum-trees. This is a very quiet Duck."

Mr. G. A. Kearnland (North, *Austr. Mus. Spec. Cat.*, no. 1, Vol. IV., p. 67, 1913) says: "Across the northern portion of Australia, Whistling Ducks (*Dendrocygna arcuata*) are usually plentiful. During the night they fly inland on the Mitchell-grass or Flinders-grass Plains and feed, but towards daybreak they frequent the rivers or lagoons for a bathe or drink, and then

WHISTLING DUCK.

cluster on the shady side of any thick bushes to sleep through the day, only moving when disturbed or to escape the sun. When the Calvert Exploring Expedition was approaching the Fitzroy River in North-western Australia, we disturbed thousands of these birds from the plains, and whilst camped near the river had no difficulty in shooting as many as were wanted. On approaching any water, a brown patch on the shady side of a tree or bush invariably proved to be a number of these birds sleeping. They generally permitted us to approach within thirty or forty yards before they moved, and then they stood up and gathered as close as possible together, with bodies and heads erect, so that by taking a shot amongst their necks one cartridge always secured enough to feed our party. They are long narrow birds, as long from bill to feet as a Black Duck, but as narrow as a Teal. Being grass feeders their flesh is excellent. They breed in great numbers amongst the spinifex or coarse grass."

Mr. George Barnard (*id.*, *ib.*) added: "Coming home with cattle on the 25th May, 1890, my sons flushed a Duck of some sort off a nest in the grass too hurriedly to see what it was: they left it till next day, when one of them rode out to identify the species; it proved to be a 'Whistler' (*Dendrocygna vagans*). The nest was made in the grass, and without any lining of feathers or down, and contained fifteen eggs in an early stage of incubation, several of which he took. This Duck is very common in the neighbourhood, and is found frequenting the large swamps, but this is the first time we have obtained the nest. Two eggs from the above nest are elliptical in form, tapering somewhat sharply to each end, which are pointed and of equal size. They are of a pale creamy-white, and in the specimens forwarded have light reddish-purple markings on one end, appearing as if beneath the surface of the shell: these markings are abnormal, one specimen having only a few spots on one side. Length (A) 2.09×1.43 inches; (B) 2.13×1.42 inches." Mr. Barnard explained: "Nearly all the Whistling Ducks' eggs taken had markings on one end, but most of those left in the nest were without them. I do not think the markings are typical, but only the effect of the season, as I have noticed the markings on butterflies and moths were darker and richer this past season than in ordinary ones."

Barnard handed the same note to Campbell and it appears in his *Nests and Eggs* (p. 1026), and Campbell's description of the eggs is also drawn up from Barnard's specimens. The rarity of nests of this bird can be gauged from the fact that both Campbell and North make the basis of their accounts the same clutch of eggs.

THE BIRDS OF AUSTRALIA.

In the *Nov. Zool.*, Vol. XVIII., p. 9, 1911, I gave the following explanation for my preference to the name there used: "In the *Cat. Birds*, Vol. XXVII., p. 153, Salvadori preferred *D. arcuata* Horsfield, *Zool. Res. in Java*, pl. 65, 1824, for the Austro-Malayan species differentiated from *D. javanica* of the same author, previously proposed in the *Trans. Linn. Soc. (Lond.)*, Vol. XIII., p. 199, 1822. Salvadori accepted *arcuata* on the plate given, but the letterpress covered *javanica*. The facts are: Horsfield proposed *javanica* and noted varieties, one of which agrees with the bird in question now considered specifically separable. In his second paper he used *arcuata* for the same group on account of its prior introduction by Cuvier in MS. only, and sank *javanica* as a synonym of the later *arcuata*. Of course, in reality *arcuata* is a pure synonym of *javanica*, the latter having priority. Count Salvadori, however, recognising that the figure given really belonged to one of the varieties, used *arcuata* as based on that figure, though the text proved the contrary. This course is not permissible. As a substitute I have fallen back upon *gouldi*, which Gould accepted for the Australian bird as of Bonaparte. Bonaparte's introduction (*Comptes Rendus*, Vol. XLIII., p. 649, 1856) was of a nude name only, so that the above quotation is the first description. Two other prior names have been used for this bird, but each I consider inapplicable. Müller's *Anas badia* (*Verh. Nat. Gesch. Land en Volkenk.*, p. 159, 1842) is another nude name, whilst Fraser's *A. vagans* was described from the Philippines (*Zool. Typica*, p. 68, 1849), and I am not inclined to accept it for the Australian form."

In my *List Birds Austr.*, p. 89, published last year, I used the name *Dendrocygna javanica gouldi* as of Gould, 1865, considering its introduction by Bonaparte in 1856 as a *nomen nudum*.

Upon further consideration I must replace it as above. The facts are as follows: In the *Nov. Synops. Av.*, no. iv., Dec., 1850, Reichenbach named "Tab. CCCXXXV. Novit. LXXII. LI^c 2650-51 *Dendrocygna arcuata (australis)* Gould *B. of Austr.*, ic. *Anas*—Cuv." On the Tab. quoted a reduced copy of Gould's coloured plate is given.

As on Pl. Lamillirostres. Anatinae. LI. *Dendrocygna*. "Figs. 171-72 *arcuata* Cuv. *javanica* Horse. Mus. Dresd." are separately given, and the reduced coloured figures appreciably differ, there can be no other conclusion save that Reichenbach named the Australian bird, as figured by Gould, subspecifically. Reichenbach's name has long priority and must therefore come into use and displace the subspecific *gouldi* whether this be admitted as of Bonaparte or Gould.

The bird figured and described is a male collected at Parry's Creek, North-west Australia, on the 18th February, 1909, by Mr. J. P. Rogers.

GENUS—CTENANAS.

CTENANAS Mathews, Austral Av. Rec., Vol. II., p. 90, 1914 .. Type *L. eytoni*.

Leptotarsis Eyton, Monogr. Anatidæ, pp. 29, 111, 1838, not

Leptotarsus Guerin, 1831 Type *L. eytoni*.

Also spelt—

Leptotarsus Schlegel, Mus. Pays-Bas, Vol. VI., Anseres, p. 87, 1866.

MEDIUM-SIZED Anatine birds with Anatine bill, long neck, long wings, long tail, very long legs and short toes.

The bill is long, longer than the head, with the culmen ridge well defined, the sides of upper mandible somewhat depressed; the small nostrils are placed high up on either side of culmen ridge near base of mandible. The edges of upper mandible bear obsolete serrations on their internal portion.

The nail of the upper mandible is well defined and overhangs the under, but the tip is rounded, not pointed.

The under mandible has a long spatulate tip; the rami enclose an unfeathered triangular depression.

The wing has the primary formula as in *Dendrocygna*.

The tail is comparatively long with hard feathers; it is about one-third the length of the wing and much longer than the metatarsus.

The legs are long with long unfeathered tibia; the metatarsus is reticulate throughout and is shorter than the tail, though noticeably longer than the middle toe without the claw.

The toes are fully webbed; the middle toe is less than the metatarsus but longer than the culmen. The hind toe is long and narrowly lobed.

CTENANAS EYTONI.

PLUMED WHISTLING DUCK.

(PLATE 207.)*

LEPTOTARSIS EYTONI Eyton, Monogr. Anatidæ, p. 111, 1838; North-west Australia.*Leptotarsis eytoni* Eyton, Monogr. Anatidæ, p. 111, 1838; Gould, Birds Austr., Vol. VII., pl. 15, 1845; Stokes, Discov. in Austr., Vol. I., pp. 419-420, App., p. 482, 1846; Leichhardt, Journ. Overl. Exped. Austr., pp. 289, 308, 423, 429, 474, 1847; Sturt, Narr. Exped. Centr. Austr., Vol. II., App., p. 57, 1849; Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 649, 1856; Pelzeln, Novara Reise Vögel, p. 137, 1865; Eyton, Synops. Anatidæ, p. 63, 1869; Mathews, List Birds Austr., p. 89, 1913; *id.*, Ibis 1914, p. 108.*Dendrocygna eytoni* Gray, List Birds Brit. Mus., pt. III., p. 132, 1844; *id.*, Genera Birds, Vol. III., p. 612, 1845; Reichenbach, Synops. Av. Natatores, pl. 99, figs. 2357-8, 1850; Sclater, Proc. Zool. Soc. (Lond.) 1864, p. 301; Gould, Handb. Birds Austr., Vol. II., p. 375, 1865; Schlegel, Mus. Pays-Bas, Anseres, p. 87, 1866; Sclater, Proc. Zool. Soc. (Lond.) 1867, p. 686; Diggles, Birds Austr., Vol. II., pl. 114, fig. 1, 1870; Hutton, Cat. Birds New Zeal., pp. 35, 77, 1871; Finsch, Journ. für Orn., 1874, p. 201; Giebel, Thes. Ornith., Vol. II., p. 31, 1875; Sharpe, Zool. Erebus and Terror Birds, App., p. 31, 1875; Ramsay, Proc. Zool. Soc. (Lond.) 1877, p. 346; Castelnau and Ramsay, Proc. Linn. Soc. N.S.W., Vol. I., p. 386, 1877; Reichenow, Orn. Centralbl., 1882, p. 23; Buller, Man. New Zeal. Birds, p. 67, 1882; Legge, Papers Proc. Roy. Soc. Tasm., 1886, p. 244, 1887; Buller, Hist. New Zeal. Birds, 2nd ed., Vol. II., p. 268, 1888; North, Aust. Mus. Cat., no. 12, p. 340, 1890; Hartert, Katal. Vögels Mus. Senckenb., p. 229, 1891; North, Proc. Linn. Soc. N.S.W., Vol. XXII., 1897, p. 60; Smith, Trans. New Zeal. Inst., Vol. XXIX., p. 255, 1897; North, Trans. Roy. Soc. South Austr., Vol. XXII., p. 190, 1898; *id.*, Vict. Nat., Vol. XIX., p. 35, 1902; Le Souëf, *ib.*, p. 68; Hartert, Nov. Zool., Vol. XII., p. 205, 1905; Buller, Suppl. Birds New Zeal., Vol. II., p. 1, 1906; Mathews, Handl. Birds Austral., p. 35, 1908; *id.*, Emu, Vol. X., p. 106, 1910; *id.*, Nov. Zool., Vol. XVIII., p. 237, 1912; North, Austr. Mus. Spec. Cat., no. 1, Vol. IV., p. 68, 1913; Macgillivray, Emu, Vol. XIII., p. 147, 1914.*Dendrocygna versicolor* Hartlaub, Erstr. Nachtr. Vögelsamml, p. 19, 1846 (nude name).* The Plate is lettered *Dendrocygna eytoni*.



H. Goodchild. del

Witherby & Co.

$\frac{2}{5}$

DENDROCYGNA EYTONI.
(PLUMED WHISTLING DUCK).

PLUMED WHISTLING DUCK.

Leptotarsis sp. Leichhardt, Journ. Overl. Exped. Austr., pp. 45, 287, 1847.

Dendrocygna arcuata (nec Cuvier) Bennett, in Slater Proc. Zool. Soc. (Lond.) 1866, p. 149.

Dendrocygna (*Leptotarsis*) *eytoni* Bennett, Proc. Zool. Soc. (Lond.) 1866, p. 418; Gray, Handl. Gen. Sp. Birds, pt. III., p. 80, 1871.

Dendrocygna (*Leptotarsus*) *eytoni* Ramsay, Proc. Linn. Soc. N.S.W., Vol. I., p. 195, 1877; Vol. II., p. 200, 1877; *id.*, Tab. List Austr. Birds, p. 22, 1888.

Dendrocygna eytoni Slater, Proc. Zool. Soc. (Lond.) 1880, p. 510; Reichenow, Vögel. Zool. Gart., p. 59, 1882; Tristram, Cat. Coll. Birds, p. 50, 1889; Salvadori, Cat. Birds Brit. Mus., Vol. XXVII., p. 165, 1895; Hall, Key Birds Austr., p. 107, 1899; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 1027, 1901; Carter, Emu, Vol. III., p. 211, 1904; Hall, Key Birds Austr., 2nd ed., p. 107, 1906; Ingram, Ibis 1907, p. 395; Berney, Emu, Vol. VI., p. 156, 1907; Littler, Handb. Birds Tasm., p. 218, 1910.

Dendrocygna eytoni munna Mathews, Austral Av. Rec., Vol. I., p. 86, 1912, Queensland; Mathews and Iredale, Ibis 1913, p. 407.

DISTRIBUTION. Australia; Tasmania (New Zealand).

Adult male. Mantle, back, scapulars, and wings lead grey with pale margins to some of the short scapulars; bastard-wing, primary-coverts, and quills dark brown, some of the secondaries slightly edged with white at the tips; lower back, rump, and upper tail-coverts dark brown with paler edges to the feathers; sides of rump yellowish-buff margined with black as also the long upper tail-coverts, the latter broadly tipped with black; tail uniform black; crown of head and hind-neck pale rufous like the fore-neck and sides of neck, becoming bright chestnut on the sides of the breast and strongly barred with black, more faintly on the middle of the breast, where the ground-colour is buff; chin and throat white, sides of face and lower throat grey; the long narrow flank plumes buff, margined with black; abdomen, thighs, and under tail-coverts white; axillaries white, broadly edged with dark brown; under wing-coverts buffy-white barred with black. Bill, upper mandible black, mottled with flesh-colour, tip brown, bar flesh-colour, lower mandible flesh-colour; eye and eye-lash yellow; tarsi and feet flesh-colour.

Adult female. Similar to the adult male. Wing 233 mm.; culmen 41, tail 70, tarsus 56.

Nest. "Similarly situated to that of the other Whistling Duck, upon the plains, in herbage, generally far from water. Has no down" (Campbell).

Eggs. "Clutch, 10 to 12 probably; roundish in form; texture of shell fine; surface glossy; colour, a light creamy outer-coating, on being removed reveals a lighter-coloured shell. Occasionally specimens are stained or minutely spotted with light brown. Dimensions in inches: 1.88-1.97 × 1.4-1.56" (Campbell).

Breeding-season. September, October, November; February (Berney).

THE lack of observations with regard to the economics of this bird is again noticeable and most regrettable. It was recorded with great pleasure by the intrepid explorers of Central Australia, Stokes, Leichhardt and Sturt, all referring to it as one of the most numerous edible fowl of the Interior, and as contributing to their welfare many times. Leichhardt especially makes notes of this, and particularly mentions the whistling flight.

THE BIRDS OF AUSTRALIA.

Stokes's notes reproduced by Gould are here again printed, as they have never been much augmented. "Many of the reaches," says Captain Stokes, when speaking of the river Adelaide of the north-western part of Australia, "swarmed with wild-fowl, consisting almost wholly of ducks, which, from a habit of perching on the trees, have received the name of Wood Ducks. Their singularly long legs, with the web very much arched near the toes, gives great pliability to the foot and a power of grasping, which enables them to perch on trees. When on the wing they make a peculiar, pleasing, whistling sound, that can be heard at a great distance, and which changes as they alight into a sort of chatter. Their perching on trees is performed in a very clumsy manner, swinging and pitching to and fro. We subsequently often found them on the rivers of the north coast, but not within some miles of their mouths or near their upper waters, from which it would appear that they inhabit certain reaches of the rivers only: we never found them in swamps. The farthest south they were met with was on the Albert River, in the Gulf of Carpentaria, in lat. 18° S., which gives them a range of six and a half degrees of latitude over the northern part of the continent. These ducks are the *Leptotarsis eytoni* of Mr. Gould."

Sturt's comments read: "This new and fine bird was first shot on Strzelecki's Creek by Mr. Browne, and was subsequently seen by me in considerable numbers on Cooper's Creek. Its range was not to the westward, nor was it seen north of the Stony Desert. I believe I am wrong in stating that the first was killed at the place above-mentioned; for, if my memory does not deceive me, we had already secured a specimen at the Depot. . . . Under ordinary circumstances, we might have fared well on this duck at Cooper's Creek, but it was so wild as to keep out of our reach, being evidently hunted by the natives of the creek."

Leichhardt notes how the natives hunt this duck.

Mr. Tom Carter states: "This was a common species in the Northwest, notably in the record wet year of 1900, when countless numbers were on the flooded flats east of Point Cloates. I shot many birds."

Mr. J. P. Rogers has written me that on March 14, 1902, he observed a female of this species with eleven young ones, associated with a duck of *Anas superciliosa* with eight young, and a duck of *Nyroca australis* with six young on Jimbaloora Swamp, North-west Australia.

Berney (*Emu*, Vol. VI., p. 156, 1907) has recorded from North Queensland: "The Whistler, as it is always called, is to be seen commonly during the summer, and less so from May to September. Although other Ducks may be seen more frequently, *D. eytoni* holds pride of place for numbers, for I have seen a hundred and twenty to a hundred and fifty

PLUMED WHISTLING DUCK.

on two or three occasions, and once a flock of three hundred. They have a rather laborious flight, and are comparatively easy shooting. They seldom nest here, but nests of eggs have been reported to me in February."

North (*Proc. Linn. Soc. N.S.W.*, Vol. XXII., p. 60, 1897) summarised his observations thus: "It is exclusively a fresh-water duck, and is generally met with in the shallow water near the margins of swamps and rivers, except during the breeding-season, when it resorts to well-grassed country some distance from water. Living chiefly on a vegetable diet, which consists principally of the tender buds of various aquatic plants and grasses, its flesh is much esteemed as an article of food, and for delicacy of flavour is considered by some to surpass that of any other duck inhabiting Australia."

The bird figured and described is a male, collected on Parry's Creek, North-west Australia, on the 3rd February, 1909, by Mr. J. P. Rogers.

GENUS—RADJAH.

RADJAH Reichenbach, Nat. Syst. Vögel., p. x., 1852 .. Type *R. radjah*.

Also spelt—

Radja Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 649, 1856.

Gennæochen Heine and Reichenow, Nomencl. Mus. Hein.

Orn., p. 343, 1890 Type *R. radjah*.

MEDIUM-SIZED Anatine birds with long broad bills, long wings, medium tails, stout legs and feet.

Anatine birds (strictly speaking) are characterised by their long bills, the length being always more than twice the depth of the bill at the base, short necks, and in having the metatarsus with a row of scutes on the front portion.

The bill is about as long as the head, the culmen rather concave; the nostrils are oval apertures placed high up near base of culmen on each side of culmen ridge which is obscurely indicated; nail rather broad and short; the lateral edges of the culmen expanded anteriorly so that the bill is broader half way from the nostrils to the tip than at the base; strong lamellæ visible on inner edges of upper mandible for all their length. The under mandible narrow, the mandibular rami enclosing an unfeathered parallel-sided groove; the nail small and flattened.

The wings are long with the second primary longest, the third longer than the first, which is longer than the fourth.

The tail is rounded and nearly half the length of the wing and more than twice the length of the culmen.

The legs are long and stout; the metatarsus has one row of scutes anteriorly placed, otherwise it is covered with reticulate scales; it is longer than the culmen and more than half the length of the tail. The toes are long and fully webbed, the hind toe narrowly lobed.

In the *Catalogue* of Birds in the British Museum, Vol. XXVII., p. 175, 1895, the species I include in the genus *Radjah* is placed under the genus *Tadorna*, the type of which is the Common Sheldrake of Europe. The differences given between the genera *Tadorna* and *Casarca* in the Key, p. 142, read:

“Edges of the bill with more or less prominent lamellæ. Bill broader towards the tip than at the base; culmen rather concave; lamellæ

RADJAH.

more developed towards the tip of the upper mandible; lower mandible with the lamellæ not projecting outwardly; feet flesh-colour; sexes similar. *Tadorna.*

Bill not broader towards the tip than at the base; culmen almost straight; lamellæ equally developed along the inner edge of the upper mandible; lamellæ on the edge of the lower mandible not projecting outwardly; bill and feet dark; sexes dissimilar. *Casarca.*"

This quotation well shows the minute differences which have been utilised for the differentiation of Anatine genera, and in the present case as *Casarca* has been admitted even by genus-lumpers, I find I must admit *Radjah*. The lamellæ on the mandibles more closely approach those of *Casarca* than those of *Tadorna*, while compared with the type of *Tadorna*, I note *Radjah* differs in its shorter wing though longer tail, while the bill is longer and broader and the legs and feet are stouter. It differs from *Casarca* in almost the same manner, so that its recognition can scarcely be denied. While admitting the difference in sex coloration as worthy of note in a consideration of generic features I would have ignored the coloration of the feet as valueless.

RADJAH RADJAH RUFITERGUM.

WHITE-HEADED SHELD-DRAKE.

(PLATE 208.)*

TADORNA RADJAH RUFITERGUM Hartert, Nov. Zool., Vol. XII., p. 205, 1905; South Alligator River, Northern Territory.

Tadorna radjah Eyton, Monogr. Anatidæ, p. 106, 1838; Gould, Birds Austr., Vol. VII., pl. 8, 1844; Gray, List Birds Brit. Mus., pl. III., p. 132, 1844; Reichenbach, Synops. Av. Natat., pl. 93, figs. 435-6, 1845; Stokes, Discov. in Austr., Vol. I., App., p. 483; Vol. II., p. 58, 1846; Leichhardt, Journ. Overl. Exped. Austr., pp. 217, 288, 291, 1847; Macgillivray, Narr. Voy. "Rattlesnake," Vol. II., App., p. 358, 1852; Lichtenstein, Nomencl. Av. Mus. Berol., p. 101, 1854; Gould, Handb. Birds Austr., Vol. II., p. 360, 1865; Gray, Handl. Gen. Sp. Birds, pt. III., p. 80, 1871 (part); Ramsay, Proc. Linn. Soc. N.S.W., Vol. I., pp. 194, 217, 386, 395, 1877; Vol. II., p. 200, 1878; Vol. III., p. 300, 1879; Vol. IV., p. 102, 1879; Masters, *ib.*, Vol. II., p. 276, 1877; Ramsay, Proc. Zool. Soc. (Lond.) 1877, p. 346; Selater, *ib.*, 1880, p. 511, 535 (part); Diggles, Birds Austr., Vol. II., pl. 111, 1877; Salvin, Cat. Birds Strickl. Coll., p. 532, 1882; North, Proc. Linn. Soc. N.S.W., 2nd Ser., Vol. II., p. 446, 1887; Ramsay, Tab. List Austr. Birds, p. 22, 1888; Tristram, Cat. Coll. Birds, p. 50, 1888; North, Austr. Mus. Cat., no. 12, p. 338, 1890.

Tadorna radjah (pt.) Salvadori, Cat. Birds Brit. Mus., Vol. XXVII., p. 175, 1895; Hall, Key Birds Austr., p. 107, 1899; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 1029, 1901; North, Vict. Nat., Vol. XIX., p. 36, 1902; Le Souëf, *ib.*, p. 68; Le Souëf, Emu, Vol. II., p. 96, 1902; Hall, Key Birds Austr., 2nd ed., p. 107, 1906; Broadbent, Emu, Vol. X., p. 245, 1910.

Radjah eytoni Reichenbach, Nat. Syst. Vögel., p. x., 1852 (part).

Radja eytoni Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 649, 1856 (part).

Anas radjah Schlegel, Mus. Pays-Bas, Vol. VI., Anseres, p. 69, 1863 (part).

Gennæochen radjah Heine and Reichenow, Nomencl. Mus. Heine Orn., p. 343, 1890.

Tadorna radjah rufitergum Hartert, Nov. Zool., Vol. XII., p. 205, 1905; Mathews, *ib.*, Vol. XVIII., p. 237, 1912.

Tadorna rufitergum Mathews, Handl. Birds Austral., p. 35, 1908; *id.*, Emu, Vol. X., p. 107, 1910; North, Austr. Mus. Spec. Cat., no. 1, Vol. IV., p. 72, 1913; Hill, Emu, Vol. XII., p. 254, 1913; Macgillivray, Emu, Vol. XIII., p. 147, 1914.

* The Plate is lettered *Tadorna rufitergum*.



H. Grönvold del

Witherby & Co

$\frac{1}{3}$
TADORNA RUFITERGUM.
(WHITE-HEADED SHIELDRAKE).

WHITE-HEADED SHELD-DRAKE.

Tadorna radjah flindersi Mathews, Austral Av. Rec., Vol. I., p. 86, 1912; Cooktown, Queensland.

Radjah radjah rufitergum Mathews, List Birds Austr., p. 90, 1913.

DISTRIBUTION. North-west Australia; Northern Territory; Queensland.

Adult male. Head and neck all round, breast and abdomen pure white, the breast crossed by a chestnut band of feathers which are narrowly barred with black; upper back maroon-chestnut with narrow black bars, the black increasing in extent on the scapulars where the chestnut becomes obsolete; lower back, rump, upper tail-coverts, and tail uniform black; lesser, median, and greater upper wing-coverts pure white, the latter series with a narrow subterminal black band; bastard-wing, primary-coverts, and quills uniform black; secondary-quills white, broadly banded with metallic green on the outer webs, the innermost secondaries black with a large median patch of maroon-chestnut on the outer webs. Bill white with a flesh-colour tinge; iris white, eye-lash yellow; tarsi and feet white tinged with flesh-colour. Total length 540 mm.; culmen 46, wing 284, tail 107, tarsus 61.

Adult female. Similar to the adult male but smaller. Total length 505 mm.; culmen 44, wing 267, tail 101, tarsus 59.

An immature bird, from Cooktown, differs in that the barring on the back is continued up to the white on the hind-neck.

Nest. "Within a hole or hollow spout of a tree, not necessarily near water." "In a hollow in a tree" (Le Souëf).

Eggs. "Clutch, probably about ten; texture of shell fine; surface smooth; colour rich creamy-white. Dimensions in inches: 2.13-2.2 × 1.58-1.63" (North).

"Clutch, four to eleven. Very light in colour, being of a very pale cream; smooth and slightly glossy. Measurements in inches: 2.28-2.41 × 1.55-1.68" (Le Souëf).

Breeding-season. December, January (Ramsay); February, April, May (Le Souëf).

THE life-history of this beautiful bird appears to be unknown. I have no notes from any of my correspondents, and Gould's notes, made seventy odd years ago, which I here transcribe, sum up our present knowledge:

"This beautiful Shieldrake is found in numerous flocks on all the lakes and swamps of the northern and eastern portions of Australia; like the other members of the genus, it frequently perches on trees and resorts to the hollow branches and boles for the purpose of breeding, the young being removed to the water by their parents immediately after they are hatched. When the rainy season has set in, and the water of the lakes has become too deep for them to reach the roots of a species of rush upon which they feed, they scatter over the face of the country, and are then to be seen wading through the mangrove bushes and over the soft mud left by the receding tide, the surface of which affords an abundant supply of food, consisting of crabs, mollusks and other marine animals. The sexes present no visible difference in their colour or markings, nor is there a sufficient difference in size to distinguish the male from the female."

Ramsay (*Proc. Zool. Soc. (Lond.)* 1877, p. 346) recorded under the name *Tadorna radjah*: "I found this fine Wood-Duck breeding in holes in the

THE BIRDS OF AUSTRALIA.

hollow limbs of trees during the months of December and January. It is a common species all over Queensland north of the Mary River. I have received specimens from Port Denison and Rockingham Bay, and also examined specimens from Port Moresby, in New Guinea. The Port Moresby birds have a much narrower pectoral band than is found in the Australian examples I have seen."

Salvadori (*Cat. Birds Brit. Mus.*, Vol. XXVII., p. 176, 1895) commented: "Australian specimens are larger, and have the back much more chestnut than those from the Moluccas and Papuan Islands."

This was followed up in 1905 by Hartert (*Nov. Zool.*, Vol. XII., p. 205), who upon comparison named the Australian bird *Tadorna radjah rufitergum*, writing: "Comparing the Australian specimens with our large series from the Moluccan Islands and New Guinea, Mr. Rothschild and I found that the former differ strikingly from the latter (i.e. typical *radjah*) by their chestnut or dark chestnut instead of brownish-black upper back. Count Salvadori has already drawn attention to the differences of Australian specimens, but has not given a name to them. The larger size of the Australian bird is not constant in a series, though generally noticeable."

In my *List Birds Austr.*, p. 90, 1913, I gave the type of *Radjah* as "*Anas radjah* Gould = *Tadorna radjah rufitergum* Hartert." This is not correct. Reichenbach gave the type as *Radjah eytoni* and quoted figures: these figures are copies of Gould's plate and one other; the other does not represent an Australian bird, and consequently *Radjah eytoni* is simply a new substitute for *Anas radjah* Garnot as a whole; Reichenbach did not differentiate the Australian bird though his figures show the differences vividly; had he done so his name would long have anticipated that of Hartert.

The bird figured and described is a male collected on Parry's Creek, North-west Australia, on the 12th February, 1909, by Mr. J. P. Rogers.

GENUS—C A S A R C A.

CASARCA Bonaparte, Comp. List Birds Europe and
N. Amer., p. 56, 1838 Type *C. ferruginea*.

Also spelt—

Casarka Eyton, Monogr. Anatidæ, p. 27, 1838.

Nettalopex Heine and Reichenow, Nomencl. Mus. Heine
Orn., p. 343, 1890 Type *C. ferruginea*.

LARGE Anatine birds with long broad bills, long wings, medium tail, long legs and long toes.

Under the genus name *Radjah* I have given Salvadori's characters for distinguishing *Casarca* from *Tadorna*. I have pointed out how *Radjah* can be recognised, and would here note the differences between *Casarca* and that genus.

The bill is long, about the same length as that of *Radjah*, but the sides do not expand so much and the culmen ridge is less defined; the nail is not well differentiated but merges imperceptibly into the sides. The lamellæ of the upper and lower mandibles project noticeably.

The wings are longer with the second primary longest, but the first nearly equalling and longer than the third.

The tail is comparatively shorter, being only about one third of the length of the wing.

The metatarsus is about the same length as that of *Radjah*, though the latter is much the smaller bird.

That is, though *Radjah* is shorter in the wing, agreeing with the smaller size of the bird, the bill is as long and the legs are as long as in the present genus, making all the proportions quite different.

CASARCA TADORNOIDES.

MOUNTAIN DUCK.

(PLATE 209.)

ANAS TADORNOIDES Jardine and Selby, Illus. Ornith., Vol. II., pl. lxii., 1828 ; New South Wales.

New Holland Shieldrake Latham, Gen. Hist. Birds, Vol. X., p. 306, 1824.

Anas tadornoides Jardine and Selby, Illus. Ornith., Vol. II., pl. lxii., 1828 ; Lafresnaye, Mag. Zool. Ois., 1836, text to pl. 36 ; Lesson, Compl. de Buff. Ois., Vol. IX., p. 534, 1837 ; Schlegel, Mus. Pays-Bas, Vol. VI., Anseres, p. 65, 1866 ; Giebel, Thes. Ornith., Vol. I., p. 364, 1872.

Anas kasarkoides Lafresnaye, Mag. de Zool., text to pl. 36, 1836 (New South Wales).

Casarka tadornoides Eyton, Monogr. Anatidæ, p. 107, 1838 ; *id.*, Synops. Anatidæ, p. 58, 1869.

Casarca tadornoides Gould, Birds Austr., Vol. VII., pl. 7, 1844 ; Gray, List Birds Brit. Mus., pt. III., p. 133, 1844 ; *id.*, Genera Birds, Vol. III., p. 613, 1845 ; Reichenbach, Synops. Av. Natatores, pl. 93, figs. 428-430, 1845 ; Stokes, Discov. in Austral., Vol. I., App., p. 483, 1846 ; Sturt, Narr. Exped. Cent. Austr., Vol. II., App., p. 55, 1849 ; Lichtenstein, Nomencl. Av. Mus. Zool. Berol., p. 101, 1854 ; Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 649, 1856 ; Sclater, Proc. Zool. Soc. (Lond.) 1862, p. 185 ; Gould, Handb. Birds Austr., Vol. II., p. 361, 1865 ; Gray, Handl. Gen. Sp. Birds, pt. III., p. 80, 1871 ; Ramsay, Proc. Linn. Soc. N.S.W., Vol. I., pp. 195, 219, 1877 ; Vol. II., p. 200, 1878 ; *id.*, Tab. List Austr. Birds, p. 22, 1888 ; Blaauw, Ibis 1894, p. 317 ; Salvadori, Cat. Birds Brit. Mus., Vol. XXVII., p. 185, 1895 ; North, Trans. Roy. Soc. South Austr., Vol. XXII., p. 190, 1898 ; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 1030, 1901 ; Littler, Emu, Vol. III., p. 216, 1904 ; Milligan, *ib.*, Vol. IV., p. 11, 1904 ; M'Clymont, *ib.*, Vol. V., p. 162, 1906 ; Batey, *ib.*, Vol. VII., p. 15, 1907 ; Hill, *ib.*, p. 23 ; Mathews, Handl. Birds Austral., p. 35, 1908 ; Hall, Emu, Vol. IX., p. 79, 1909 ; Crossman, *ib.*, p. 86 ; Whitlock, *ib.*, p. 190, 1910 ; Littler, Handb. Birds Tasm., p. 218, 1910 ; Ogilvie-Grant, Ibis 1910, p. 174 ; Orton and Sandland, Emu, Vol. XIII., p. 76, 1913 ; North, Austr. Mus. Spec. Cat., no. 1, Vol. IV., p. 70, 1913 ; Mathews, List Birds Austr., p. 90, 1913.

Tadorna tadornoides Hartlaub, Syst. Verz. Ges. Mus., p. 118, 1844 ; Sclater, Proc. Zool. Soc. (Lond.) 1864, p. 191, pl. xviii., *id.*, *ib.*, 1880, p. 512 ; Legge, Papers Proc.

♂
CASARCA TADORNOIDES.
(MOUNTAIN DUCK).

H. Grönvold. del.

Witherby & Co.



MOUNTAIN DUCK.

Roy. Soc. Tasm., 1886, p. 244, 1887 ; Tristram, Cat. Coll. Birds, p. 59, 1889 ; Hartert, Katal. Vögels Mus. Senckenb., p. 228, 1891 ; Mathews, Nov. Zool., Vol. XVIII., p. 237, 1912 ; White, Emu, Vol. XII., p. 183, 1913.

Vulpanser tadornoides Reichenow, Orn. Centralbl., 1882, p. 35 ; *id.*, Vögel. Zool. Gart., p. 62, 1882.

Nettalopex tadornina Heine and Reichenow, Nomencl. Mus. Hein. Orn., p. 343, 1890.

Casarca tadernoides Hall, Key Birds Austr., p. 107, 1899 ; Milligan, Emu, Vol. II., p. 76, 1902 ; Hill, *ib.*, p. 167, 1903 ; Hall, Key Birds Austr., 2nd ed., p. 107, 1906 ; *id.*, Emu, Vol. IX., p. 133, 1910.

Tadorna tadornoides westralis Mathews, Austral Av. Rec., Vol. I., p. 118, 1912 ; South-west Australia.

DISTRIBUTION. New South Wales ; Victoria ; Tasmania ; South Australia ; South-west Australia.

Adult male. Head and upper-neck all round glossy black followed by a white collar ; a short white line immediately below the eye ; fore-neck, breast, lower hind-neck, and mantle rufous chestnut ; back and scapulars black, finely vermiculated with sandy-buff like the sides of the body, abdomen, and under tail-coverts ; lesser, median, and greater upper wing-coverts pure white ; bastard-wing, primary-coverts and quills black ; secondary-quills glossy green on the outer webs, brown on the inner ones and fringed with white, some of the inner secondaries almost white with only a little brown freckling near the tip, the innermost secondaries chestnut on the outer webs and dark grey on the inner ones ; rump, upper tail-coverts, and tail black ; axillaries and under wing-coverts white, the greater under wing-coverts pale brown like the quill lining. Bill black ; iris dark brown ; feet greyish-brown. Total length 740 mm. ; culmen 45, wing 368, tail 118, tarsus 64.

Adult female. Differs from the adult male in having the feathers encircling the base of the bill white, also a white ring round the eye which broadens out on the hinder part, the white collar narrower, the chestnut not so uniform in colour and extending on to the sides of the body, and the abdomen brown instead of black. Total length 730 mm. ; culmen 40, wing 343, tail 114, tarsus 56.

Immature female. Differs in having the crown of the head more freckled with brown.

Immature male. Differs from the adult female in having much less white at the base of the bill and round the eye, the head brown instead of black, and the chestnut on the fore-neck, breast, hind-neck, and mantle much paler, abdomen also paler.

Nestling in down. Pure white marked with pale brown on the head, hind-neck, back, wings, tail, middle of the back, and on the sides of the back leading towards the thighs.

Nest. Usually placed in a hollow limb of a tree ; sometimes near water, but often not. Sometimes nests in rabbit-burrows and on the ground. Nest lined with down.

Eggs. Clutch, 8 to 14 ; ground-colour creamy-white, surface glossy ; axis 68-70 mm., diameter 49-50.

Breeding-season. July to December.

ALTHOUGH I have received more notes concerning this bird it will be obvious to the student that little is yet known of its habits, and there is still much to do.

THE BIRDS OF AUSTRALIA.

It was first described by Latham in the *General History of Birds*, Vol. X., p. 306, 1824, under the name New Holland Shieldrake, where a reference is given to "Cook's Last Voy., I, 229," which I have not yet traced.

Four years later Jardine and Selby described it, giving it the Latin name *Anas tadornoides*.

Sturt (*Narr. Exped. Centr. Austr.*, Vol. II., App., p. 55, 1849) wrote: "This beautiful duck, the pride of Australian waters, is a bird of the finest plumage. He is called the Mountain Duck by the settlers, and may be more common in the hills than the low country, since he is seldom found in the latter district. This bird builds in a tree, and when the young are hatched, the male bird carries them in his bill down to the ground. Strange, whose name I have already mentioned, had an opportunity to watch two birds that had a brood of young in the hollow of a lofty tree on the Gawler: and after the male bird had deposited his charge, he went and secured the young, five in number, which he brought to me at Adelaide, but I could not, with every care, keep them alive more than a month. It is not a good eating bird, however, as is often the case with the birds of the finer plumage."

Mr. Tom Carter writes: "I have only seen this handsome species in South-west Australia. They are simply in thousands on Lake Muir (salt water) where I saw them in April and December, 1911. I was shown an old nest that had contained twelve eggs shortly before my December visit. I climbed to it, which was placed 25 feet from the ground in a large Jate tree (eucalyptus) in a hollow branch. The nest was about six feet below the entrance hole and was largely lined with down. The tree was half a mile from the Lake edge and grew on the edge of a crop of wheat. Nov. 4, 1902. Noted small young with the parent birds on the Vass River, where they are not uncommon on the lower tidal part."

Mr. E. J. Christian records from Victoria: "Why this bird is called 'Mountain Duck' I don't know, as its home is on the plains of the Western District, and is also found from July to October up here and I have always found it in the centre of the open plain. The drake is a large bird and is generally attended by four or five ducks. They are often seen right away from water and are fairly tame. Last year (1907) when the grasshoppers were bad, I used to approach these birds on horseback and could see them eating them as fast as they could. They also did good work when the caterpillar pest came. They build in a hollow in a high gum-tree." Later he added: "Oct. 5, 1909. I noticed first drake since last autumn, but whether they are migratory or not I cannot say."

MOUNTAIN DUCK.

Mr. Sandland wrote: "Very rare visitor at Balah, South Australia, Fairly common round Burra. Have heard of several nests being taken on Koonoona Station. Occasionally nests down an old rabbit-burrow."

Mr. J. W. Mellor's account reads: "Known as the 'Mountain Duck' by the people, on account of the bird going back into the hills and often far from the low swampy land to carry on its breeding, although this is not always the case, as I have found them breeding close to the swamps, but even then high and dry on some elevated land. They often lay in hollows of trees, high up some large eucalypt, which has fallen into decay in places, and so left a large hole, in which the duck deposits her eggs, the clutch being from eight to a dozen, of large size and of a whitish, creamy colour, being well glossed on the surface like the general eggs of the duck family. I have also known them to lay in rabbit-burrows, where trees were not available. These birds I have seen breeding fairly well about Lakes Alexandrina and Albert, where they make their nests on the rising sandy soil, and beneath the long, overhanging, spine-like leaves of the grass tree (*Xanthorrhœa*) which reach right to the ground, and so make a closed-in hollow; the nest is lined with down plucked from the breast of the bird, and as soon as the young are hatched, they can run with remarkable rapidity and make off for water. The call of the Mountain Duck is somewhat peculiar, being a harsh 'chank chank' resembling that of a goose, uttered twice, the call being made on the wing as well as on the ground, but while on the ground a second note will often be uttered by the drake resembling 'chick-hunke' or 'chick-oöke' the o's being sounded softly, the note being made with outstretched neck, and the head near the ground, the 'chick' being forced out sharply as through the nose, while the latter 'hunke' is more drawn out especially in the centre, and of a decidedly guttural tone, from the breast of the bird. They will stand being kept in captivity, but not in close confinement, as their nature is somewhat of a roving disposition, and they require open runs, with plenty of grass, etc., upon which they live to a certain extent, their diet being also composed of grain. They are not found in large flocks as a rule, preferring to go in small parties of six to a dozen, and when the breeding-season approaches they pair off and seek their nesting haunts in couples. This is during the months of August, September and October. In the early days they were plentiful about the reed-beds during the winter months, but now the advance of civilization has driven them away, as they are a timid bird, and easily frightened, being constantly on the watch night and day, as

THE BIRDS OF AUSTRALIA.

they are as much nocturnal as they are diurnal, and one would wonder when they take their rest."

Captain S. A. White's notes, also regarding South Australia, confirmed the preceding, but a later one made upon Lake Albert, reads pleasantly: "I had never seen more than twenty to thirty of these birds together before, but this trip opened our eyes. By lying flat down in a small duck boat we were able to get within thirty yards of a flock of these birds, which would be under-estimated if put down between three and four thousand. On rough days when the surface of the lake was much disturbed, they assembled in a dense mass on a spit some distance from the shore, in company with many kinds of ducks, pelicans, spoonbills, crane, etc. When the weather was fine they spread out over the shallow parts of the lake, feeding upon the weed at the bottom. The female makes a loud, harsh, nasal, carking cry, and the male answers with a deep short note like a grunt. We found these birds were not nearly so good eating as other duck, still they are far from what some people think—that is unedible, and we were glad at times to get their flesh to eat."

Hall (*Emu*, Vol. IX., p. 79, 1909) observed: "Feeds upon the short mossy grasses in the same way as the Maned Goose. This causes quick decomposition of the bird when killed in summer."

In view of Mr. Mellor's experiment with the nestlings of *Chenonetta jubata* (ante, p. 57), it should be recorded that Campbell (*Nests and Eggs*, Vol. II., p. 1031, 1901) has reproduced the account of a writer in the weekly newspaper *The Australasian*, who unfortunately signed himself "Nemo." This writer asserted that this bird carried its young in its bill from the nesting-hole to the ground. More reliable observations must be made to reconcile this assertion with Mr. Mellor's results above referred to.

Mr. T. P. Austin (North, *Austr. Mus. Spec. Cat.*, no. 1, p. 71, 1913) noted: "On Barwon Park Station, near Winchelsea, Victoria, the Mountain Duck (*Casarca tadornoides*) was to be seen on the brackish and salt lakes at all times of the year, but never in very large numbers. Although not looked upon as a suitable bird for the table, consequently never shot at, they were always very wild, in fact the wildest of all the Ducks. A few pairs bred on this station every year, as I always saw young birds about, often just hatched, but it was a puzzle to me where they had their nests; I never found one or heard of one being found. The only trees about were a few Red Gums along the Barwon River. It was a most unusual thing to see any of these Ducks at fresh water."

Dr. Macgillivray's account (*ibid.*) reads: "Of the *Anatinæ* found here (Hamilton, Western Victoria) *Casarca tadornoides* is the earliest breeder, eggs

MOUNTAIN DUCK.

being obtainable in July and early in August. This species is usually seen in pairs, but I once counted forty in a flock on a swamp on the Murndal Estate. It is very wary, leaving a swamp or lagoon when the first shot is fired, and not returning again; most other Ducks will circle round and round and alight more than once before becoming thoroughly alarmed."

Mr. G. A. Kearnland wrote (*ibid.*): "The Sheldrake (*Casarca tadornoides*) is found all over the Australian continent. I have shot these birds in Southern Victoria and in North-western Australia, but the western district of Victoria and the swamps in the vicinity of the Murray River appear to be their favourite haunts. Except when the young ones are with their parents they are usually found in pairs. They breed in hollow branches, preference being given to trees overhanging water. When the brood is hatched the old bird swims under the nest and calls the little ones, which jump down into the water, flapping their little wings and working their feet as they drop. As soon as they are all down the old bird swims away to a nice landing-place. Their flesh is somewhat coarse, although they are grass feeders."

The male bird figured and described was collected at Newstead, near Castlemain in Victoria, in December, 1862.

GENUS—ANAS.

- ANAS Linné, Syst. Nat., 10th ed., p. 122, 1758 .. Type *A. platyrhynchos*.
Anassus Rafinesque, Analyse de la Nature, p. 72,
 1815 (cf. *Auk*, 26, p. 52). Substitute name for
Anas L. Type *A. platyrhynchos*.
Boschas Swainson, Fauna Boreal-Amer. Birds,
 p. 442, 1832 Type *A. platyrhynchos*.

MEDIUM-SIZED Anatine birds with long bills, medium necks, long wings, short legs and long toes, the hind toe narrowly lobed.

The bill is longer than the head, depressed, somewhat concave above, anterior to the nostrils, which are oval apertures placed near the base of the culmen; the depth of the bill at the base is about equal to its width, and is less than half its length; culmen ridge not differentiated and scarcely indicated; nail not well distinguished, broad and flattened, tip scarcely overhanging and not pointed; lamellæ on the edges of the upper mandible regularly comb-like, projecting a little. Under mandible narrow; mandibular rami parallel, enclosing a narrow unfeathered tract, nail fusing with rami; lamellæ on the edges appearing as a well-defined comb.

The wings are long with the second primary longest, first subequal with third.

The tail is short, about one-third the length of the wing, the feathers rather pointed.

The metatarsus is short, less than half the length of the tail and has a row of scutes on the anterior face, otherwise coarsely reticulate. The toes are long and fully webbed, the middle toe longer than the metatarsus but shorter than the culmen. The hind toe is small.



H Goodchild del

Witherby & Co

$\frac{1}{2}$
ANAS SUPERCILIOSA.
(BLACK DUCK)

ANAS SUPERCILIOSA ROGERSI.

BLACK DUCK.

(PLATE 210.)*

ANAS SUPERCILIOSA ROGERSI Mathews, Austral Av. Rec., Vol. I., p. 33, 1912; Augusta, South-west Australia.

Anas superciliosa (pt.) Lesson, Traité d'Ornith., p. 633, 1831; Gray, List Birds Brit. Mus., pt. III., p. 135, 1844; *id.*, Genera Birds, Vol. III., p. 615, 1845; Gould, Birds Austr., Vol. VII., pl. 9, 1845; Reichenbach, Synops. Av. Natat., pl. 85, figs. 913-914, 1845; pl. 94, fig. 2347, 1850; Sturt, Narr. Exped. Centr. Austr., Vol. II., App., p. 56, 1849; Macgillivray, Narr. Voy. "Rattlesnake," Vol. II., App., p. 358, 1852; Blyth, Cat. Birds Mus. As. Soc. Bengal, p. 304, 1852; Lichtenstein, Nomencl. Mus. Zool. Berlin, p. 101, 1854; Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 649, 1856; Gould, Handb. Birds Austr., Vol. II., p. 363, 1865; Ramsay, Ibis 1866, p. 335; Schlegel, Mus. Pays-Bas, Anseres, Vol. VI., p. 42, 1866; Müller, Proc. Zool. Soc. (Lond.), 1869, p. 280; Gray, Handl. Gen. Sp. Birds, pt. III., p. 82, 1871; Pelzeln, Ibis 1873, p. 123; Ramsay, Proc. Linn. Soc. N.S.W., Vol. I., pp. 77, 195, 216, 219, 1876-7; Vol. II., p. 200, 1878; *id.*, Proc. Zool. Soc. (Lond.) 1877, p. 346; *id.*, Proc. Linn. Soc. N.S.W., Vol. IV., p. 102, 1879; Selater, Proc. Zool. Soc. (Lond.) 1880, p. 517, 535; Legge, Papers Proc. Roy. Soc. Tasm. 1886, p. 244, 1887; *id.*, *ib.*, 1887, p. 97, 1888; Ramsay, Proc. Linn. Soc. N.S.W., 2nd Ser., Vol. I., p. 1152, 1887; *id.*, Tab. List Austr. Birds, p. 22, 1888; North, Austr. Mus. Cat., no. 12, p. 341, 1890; Heine and Reichenow, Nomencl. Mus. Hein., p. 345, 1890; North, Trans. Roy. Soc. South Austr., Vol. XXII., p. 190, 1898; Hall, Key Birds Austr., p. 107, 1899; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 1033, 1901; Le Souëf, Emu, Vol. II., p. 159, 1903; Hill, *ib.*, p. 167, 1903; Milligan, *ib.*, Vol. III., p. 19, 1903; Carter, *ib.*, p. 211, 1904; Littler, *ib.*, p. 216, 1904; Kilgour, *ib.*, Vol. IV., p. 38, 1904; Legge, *ib.*, p. 107, 1905; Lawson, *ib.*, p. 137, 1905; D'Ombraïn, *ib.*, p. 162, 1905; Hartert, Nov. Zool., Vol. XII., p. 206, 1905; Hall, Key Birds Austr., 2nd ed., p. 107, 1906; Berney, Emu, Vol. VI., p. 156, 1907; Batey, *ib.*, Vol. VII., p. 14, 1907; Hill, *ib.*, p. 23, 1907; Austin, *ib.*, p. 79, 1907; Ingram, Ibis 1907, p. 395; Mathews, Handl. Birds Austral., p. 35, 1908; Whitlock, Emu, Vol. VIII., p. 194, 1909; Gibson, *ib.*, IX., p. 76, 1909; Hall, *ib.*, p. 78, 1909; Crossman, *ib.*, p. 86, 1909; Hall, *ib.*, p. 133, 1910; Whitlock, *ib.*, p. 190, 1910; Howe, *ib.*, p. 229, 1910; Batey,

* The Plate is lettered *Anas superciliosa*.

THE BIRDS OF AUSTRALIA.

ib., p. 244, 1910 ; Littler, Handb. Birds Tasm., p. 219, 1910 ; Ogilvie-Grant, Ibis 1910, p. 174 ; Barnard, Emu, Vol. XI., p. 20, 1911 ; Stone, *ib.*, XII., p. 121, 1912 ; Mellor and White, *ib.*, p. 161, 1913 ; White, *ib.*, p. 183, 1913 ; Hill, *ib.*, p. 254, 1913 ; Orton and Sandland, *ib.*, XIII., p. 76, 1913 ; North, Austr. Mus. Spec. Cat., no. 1, Vol. IV., p. 74, 1913 ; White, Emu, Vol. XIII., p. 124, 1914 ; Macgillivray, *ib.*, p. 147, 1914 ; Barnard, *ib.*, Vol. XIV., p. 41, 1914.

Anas novæhollandiæ Stokes, Discov. in Austr., Vol. I., App., p. 483, 1846 ; nomen nudum ;
Leichhardt, Journ. Overl. Exped. Austr., pp. 203, 291, 1847 ; nomen nudum.

Anas superciliosa superciliosa Mathews, Nov. Zool., Vol. XVIII., p. 237, 1912.

Anas superciliosa rogersi Mathews, Austral Av. Rec., Vol. I., p. 33, 1912 ; *id.*, List Birds Austr., p. 91, 1913.

DISTRIBUTION. Australia ; Tasmania.

Adult male. General colour above bronze-brown, the feathers everywhere margined with buff slightly darker and more blackish-brown on the lesser and median upper wing-coverts where the margins are grey ; outer greater coverts velvety black, which form a short black bar on the wing ; primary-coverts and primary-quills uniform bronzy-brown ; outer webs of secondaries dark metallic green, subterminally velvety black and edged with white at the tips, outer webs of some of the inner secondaries also velvety black, the innermost secondaries like the long scapulars ; tail-feathers bronze-brown edged with rufous buff ; crown of head black as also a broad line in front, below, and behind the eye, another short black line from the gape on to the fore-cheeks ; chin and throat buff, as also a broad line on the sides of the face and the superciliary streak ; hinder cheeks, sides of the upper-neck and hind-neck minutely streaked with dark brown ; entire surface below bronze-brown with pale or rufous edgings to the feathers ; sides of the body like the upper-surface ; under wing-coverts pure white, some outer greater coverts pale grey on the outer webs. Bill black ; iris brown ; feet yellowish-brown. Total length 580 mm. ; culmen 54, wing 272, tail 91, tarsus 49.

Adult female. Similar to the male but smaller and the general markings paler and coarser. Bill blue-black ; iris reddish-orange ; feet orange-yellow. Total length 557 mm. ; culmen 52, wing 248, tail 82, tarsus 43.

Nestling in down. Sooty-brown above with yellowish-white markings on each side of the back and rump ; throat and sides of the face yellowish buff, which is crossed by a black streak through the eye and a short one on the hinder cheeks ; under-surface straw white with a buffy tinge on the fore-neck. As the bird grows it practically assumes the adult plumage as soon as the downy stage is passed.

Nest. Sometimes placed in deserted nests in trees ; at others in a hole in a tree ; at others under a small bush sometimes near water, or some distance from it. Composed of grass and leaves lined with down, and measures about a foot across by six inches deep.

Eggs. Clutch, eight to thirteen ; ground-colour pale greenish-white, surface smooth and slightly glossy. Mostly nest stained. Axis 56 to 58 mm. ; diameter 41 to 42.5.

Breeding-season. January to April (ducklings in June), (North Queensland) ; July and August (Tasmania) ; August to October (November ?).

ON account of its dull coloration and commonness this bird has no early history, being simply classed in "Ducks." Confused with the New Zealand race, almost all the early technical references simply refer to the latter.

BLACK DUCK.

Captain S. A. White's notes read: "This is one of the most familiar birds to South Australians, and they are dispersed throughout the State, frequenting the sea-coast as well as inland waters. They nest in August and September and very often a considerable distance from water: they are very fond of a standing crop to nest in and it is not uncommon to see thirteen eggs in a clutch."

Mr. J. W. Mellor wrote: "Found all over Australia, there being not a better known bird to the people of our Continent, where it is universally known as the 'Black Duck.' Its haunts are so well known, and its distribution so wide that it is almost unnecessary to state them. At the Reed-beds near Adelaide they were in thousands in former times, but now are only seen in small lots of ten or twenty, and more often singly or in pairs. They are to be seen on almost every lake or swampy land, where they live on seeds of grass or aquatic plants, also eat a lot of the leaves of plants, such as thistles, etc. They are fond of 'dock' seed, which is found abundantly on swampy land. On Lakes Alexandrina and Albert, on the Coorong in South Australia, I have seen them in vast flocks, but they are so molested now by 'sportsmen' (?) that they are becoming much more scarce. They nest in a variety of places. I have found them in the flags and reeds right in the water, also in the thick, high grass far from their 'native element'; also in hollows of trees high up from the ground. The eggs are generally of a creamy colour and well glossed on the surface and vary considerably in number, from 6 to 8 up to twelve to a clutch. These were not plentiful (on the Islands) and generally seen in pairs, their absence being due doubtless to their nesting at this time: a nice snug nest was seen on an island, containing nine eggs, being about twelve inches across, and nine inches bowl and six inches deep, composed of scraps of grass and leaves, warmly lined with down from the bird's breast."

Mr. Tom Carter has given me the following note: "I found this species not nearly so numerous in the Mid-west as *Nettion gibberifrons*, *Nyroca australis* or *Dendrocygna eytoni*. In fact they were rather rare in my district. In the South-west it is the commonest species, and to be seen on any small water-hole or creek. Every year there are several broods reared in my paddocks at Wensleydale. At the excavated stock tank, 200 yards from the house, the birds become very tame, and even come to the stables and stockyards, midway between the house and tank, to pick up grains of corn from the dung of horses and cattle, and off the ground. At milking-time I have seen them actually underneath the cows, and a man milking within five yards. One used to feed

THE BIRDS OF AUSTRALIA.

regularly from a box in company with a sick Ram, that had allowances of chaff. The nests are thickly lined with down, and may be placed on the very edge of the water, or built under a bush a mile distant from any water. Only last week I found a nest from which young had hatched this year in such a position. The earliest date on which I have noted eggs was July 25, 1912, when I found eight in a nest. I think these birds had a second brood as I saw very small young in down, at the same place on October 20, 1912. Sept. 22, 1907. Nest with 8 fresh eggs. These hatched about Oct. 17. August 16, 1908. A nest found on open sand plain, far from water. Oct. 28, 1910. Young in down about two days old. Oct. 21, 1908. Young over three-quarters grown. Nov. 2, 1906. Small young in down. Nov. 7, 1905. Young in down."

Mr. Sandland writes: "Often seen on the tanks at Balah, South Australia: never very plentiful."

Mr. E. J. Christian, writing from North Victoria, states: "The bird has not been here for six months. After the heavy rains at Christmas, 1907, they came here and were seen on every swamp; they stayed till the middle of January and after that only an odd one or two. It prefers the swamp to the dam except in the evening or early morning. It builds in trees and carries its young down to water. One built (1906) in a deserted Black-backed Magpie's nest here, in a *Casuarina*, and brought out a brood."

Mr. James J. Scrymgeour (Callandoon) writes: "A Black Duck's nest in a dead gum tree a mile and a quarter from water. Two seasons previously an Eagle Hawk built there and part of the old nest of the latter was clearly visible."

"Found nest of twelve eggs on Oct. 13th, 1909, in hollow of tree about four feet from the ground: on Nov. 18th the young had all left the nest. On Oct. 16, 1909, I saw a nest with eggs covered with feathers: at first I thought the nest was empty."

Mr. Dove on the 10th May, 1909, wrote from Tasmania: "At the same time as the *Graucali* (Cuckoo-Shrikes) were making to the North-west, a considerable flock of duck (probably either Black Duck or Grey Teal, but too high to determine—they both frequent our river) passed at a much greater altitude than the Cuckoo-Shrikes, heading about N.N.E., right out over the Straits: they were flying straight and hard, and possibly would be going over to the Furneaux Group of Islands. I do not know whether there is any interchange between our duck and the mainland individuals."

BLACK DUCK.

Miss J. Fletcher sent me the following notes from Cleveland, Tasmania: "Last season I discovered that the Macquarie River was a great place for all kinds of wild Ducks, but unfortunately owing to the extra wet season the river was constantly in flood and hundreds of eggs and nests of various waterfowl were washed away. These birds were plentiful but shy. They nested on the marshes some distance from the water, but I have never found the nest myself. Principally because their clutches are laid in July and early August, and the weather was wild and stormy. On 16 Aug., 1910, a boy's dog flushed a Black Duck from a nest in a sword-grass tussock where she was sitting on eight ducklings. Next day they had left the nest. Oct. 31, 1910. I had a clutch of Black Duck eggs sent to me. Nest was in sword-grass tussock in swamp, and eggs were hard set."

Mr. Robert Hall, writing of the Birds of the Murray River District in the *Emu*, Vol. IX., p. 78, 1909, states: "This species and the Teal are the first to pair and nest. Both young and adult love to fish about the lilies and 'pussy-tail' weeds in search of shrimps and little 'yabbies.' A flock will get in close order to fish by themselves and not in conjunction with the Coots as some other Ducks do. By adopting this mass method they generally 'bustle' the shrimps as the Pelicans do the beach fishes. When travelling a boat through the lagoon waters the shrimps and bream jump out because of fright. The birds appear to purposely frighten the shrimps in the shallow waters. The Cormorants will catch above as well as below when hunting in this way. On 29th April, 1907, as many as 300 Cormorants of mixed species were hunting in mass upon the weedy lagoons, where many Duck were also. The Black Duck is about the heaviest for its size, and invariably reaches the highest market price. (Melbourne)."

Mr. G. Savidge (*Austr. Mus. Spec. Cat.*, no. 1, Vol. IV., 1913, p. 75) records: "The Black Duck (*Anas superciliosa*) is found in all kinds of situations on the large inlets of the sea, rivers, swamps, lagoons, and even small waterholes are sometimes tenanted by a pair or so. I have seen it on the Ulmarra Swamps in large flocks comprising many hundreds; it is close on thirty years ago since my first acquaintance with it in the Clarence River District, and at that time it was so numerous it was no uncommon thing for a couple of guns to bag over one hundred in a single day. I have seen and heard them rise from the Ulmarra Swamps like the distant roar of thunder, and found their breeding-places many times, mostly in long blade grass and rushes, but not infrequently in the hole of a tree some distance from water."

THE BIRDS OF AUSTRALIA.

In the same place Mr. G. A. Kearnland writes: "The Black Duck (*Anas superciliosa*) is undoubtedly the favourite Duck of our sportsmen, and being a strong flier it is able to change its quarters when its food supply becomes exhausted in any district. Although Black Ducks sometimes make their nests amongst reeds or rushes, they usually lay in hollow trees, often a mile or more from water. A friend living at Hedi informed me that one used to fly out of a hollow tree near his track to the gate. He watched it until one day he saw the duck had something in its bill as it flew to the horse-pond, but soon returned to the nest. He concealed himself near the pond, and saw the bird make nine more trips, carrying a duckling in its bill each time. As each little one was dropped in the water it dived and swam to the rushes, but as soon as they were all away from the nest the old mother called her brood together and remained with them."

Mr. T. P. Austin also added: "When nesting in hollow trees they do not always fly away when disturbed. I have seen them come to the entrance of the holes, and there sit perfectly still with head straight out, much the same as they do in hiding when wounded. . . . At harvesting time they can be heard in the wheat paddocks soon after dark; wheat appears to be their principal food when they can get it, and they seem to be able to find it in the paddocks long after the harvesting is finished. Nearly all the Black Duck I shot in March had wheat in them, some of them great quantities."

Berney wrote (*Emu*, Vol. VI., p. 156, 1907): "The bonnie Black Duck is, among the aquatic game birds, the most constant resident. They nest with us every season, selecting the months January to April for the purpose, the most eggs being hatched during March and April, but I have a note that I saw a brood of six downy ducklings on 6th June, 1903, and I flushed a family of flappers on 2nd September in the same year. They do not flock here like Whistlers or Wood Duck, but distribute themselves in small parties among the bulrushes and lignum along the bore streams, where they can be walked up and make excellent shooting. They weigh from 2 to 2½ pounds."

The determination of subspecies is difficult owing to the variation and the dull coloration, and when Rothschild and Hartert discriminated a subspecific form under the name *Anas superciliosa pelewensis* in the *Nov. Zool.*, Vol. XII., p. 248, 1905, they concluded: "There is no doubt that the specimens from the Pelew Islands, Samoa, Fiji, and most conspicuously those from the Solomon Islands, are very much smaller (wings 1 to 2½ inches shorter, bill smaller, etc.) than those from Australia

BLACK DUCK.

and New Zealand. To emphasize this fact we use the above nomenclature. *A. s. pelewensis* is the only available name for the small race. *Anas leucophrys* Forster (1844) refers to the New Zealand form: *Anas mülleri* Bonaparte (1856) is a nomen nudum. There is, nevertheless, one difficulty, the specimens from the Kangean Islands, near Java, and those from Java, are also as small, or nearly as small, as those from the South Sea Islands, while those from Savu, Timor and Sumba are of the big race. The question therefore arises whether there are two small races, one in the Pacific and another on the Sunda Islands, or whether all these form one small race. Against the first possibility stands the fact that all those small birds are—at least so it seems to us, after having examined a few examples only!—apparently alike, and with the second possibility the distribution does not seem to agree very well. At present we can, therefore, only emphasize the fact that there is, besides the larger *Anas superciliosa superciliosa* from New Zealand and Australia, a small race in the Pacific, which we call *A. superciliosa pelewensis*."

In the *Nov. Zool.*, Vol. XXI., October, 1914, Rothschild and Hartert dealing with a collection of birds from the Admiralty Islands under the name *Anas superciliosa pelewensis* write: "♀, ♀, wings 223, 224 mm. With regard to the differences of the smaller form we can only repeat what we have said in 1905. The two birds from Manus certainly belong to the smaller race—from their size and generally dark colour. This race has wings from 220-242 mm. in length."

Then follows a criticism of my separation of *A. s. rogersi*, where the arguments scarcely coincide with the facts which could be recognised from a consideration of my data. I should have concluded that Messrs. Rothschild and Hartert would have decided that a re-examination of material was necessary, but these workers do not appear to have thought it worth while to attempt to improve upon their work of nine years earlier. They criticise my quotation of a single wing length, but it should have been obvious that the measurement given was of the type specimen, and that specimen was taken as typical of the subspecies. They suggest that no series was measured, as no detailed list of measurements nor the number of specimens examined was given. *This error (!) they themselves commit in the same paragraph* that they comment upon my oversight. Yet I do not see the value of pages of measurements, as the mode of measuring is more or less peculiar to the individual, and Messrs. Rothschild and Hartert declare that they cannot make the same figures to a millimetre as I do. I have also found the same difficulty and consequently save paper by allowing each worker to make his own measurements and arrive at his own conclusions. If mine be correct their

THE BIRDS OF AUSTRALIA.

results will coincide. Messrs. Rothschild and Hartert apparently considered it too much trouble to do this but wrote their criticism instead. I fail to see that they have added to our knowledge of the subject by this contribution. It must be remembered that in the present case we are dealing with a bird which shows no change of plumage from immature to adult, no sexual or seasonal change. Consequently it is difficult to gauge the age of a bird and it is certain that the birds grow larger with age. Such a bird needs prolonged study and much consideration but rarely gets it.

If a series from New Zealand be examined, bearing the above fact in mind, in comparison with a series from Australia, they will be found to average *larger*. New Zealand is the type locality of *Anas superciliosa*, and when I introduced *Anas superciliosa rogersi* I regarded East Australian birds as typical. Hence my conclusion that the West Australian birds were larger. I now unite both East and West Australian forms as differing from the Neozelanic form, and would note that the former are generally lighter in coloration.

In the same place Rothschild and Hartert offer remarks on two other matters, and I think a few words may be here given in connection with those. It does not appear to aid much in the advancement of scientific knowledge to enter into discussion with regard to debatable points, especially when no new facts are introduced into the arguments. Thus, Rothschild and Hartert dismiss my hypothesis in connection with "*Demigretta sacra*," accepting that name and simply noting that I appeared to have overlooked the fact that Dr. Heinroth had taken a white bird and a grey one from the same nest, and that other Herons present more or less similar dichromatism. They conclude it would simply be the upholding of one theory against another, *which has many more probabilities* in its favour. In making this statement they do not appear to have studied the facts I produced nor did they work at the collection of Herons in the British Museum. If they had done so with careful criticism of the material available they might have rearranged their ideas. My own conclusions were arrived at by a fair consideration of the specimens at hand in conjunction with the reports of reliable bird-observers. The rejection of my theory without contravention of my arguments, without study of much material and without consideration of the facts themselves, is not conducive to much advancement. Of course, the fact that no white birds appear in New Zealand is minimised, and they give their reading of the Crow question. Thus they state that the two Crows (*Corvus cornix* and *C. corone*) inhabit strictly limited areas and inter-breed only when they meet. When the distribution of the Herons (called *Demigretta sacra* by Rothschild and Hartert) is accurately worked out, the same facts

BLACK DUCK.

may be displayed. Workers engaged upon Palæarctic birds, when they make incursions into extra-limital regions, often fail to realise that south of the Equator very different barriers act and that boundaries may be framed which would look very erratic if placed upon a map, yet are natural and governed by natural conditions in reality. Thus it may be suggested that the White birds are more Northern than the Grey ones, and as facts might be adduced the observations that Grey birds only occur in New Zealand and are the commonest in Southern Australia, both East and West, while since my article was prepared Macgillivray has recorded (*Emu*, Vol. XIII., p. 145-6, 1914) that on islands near Cape York, North Australia, "the birds were in hundreds—nearly all white birds, only a few odd grey ones amongst them." Such facts as these, which are of great interest, are lost sight of when a policy such as that advocated by Rothschild and Hartert is adopted.

This paper by Rothschild and Hartert otherwise shows signs that these authors are not paying sufficient attention to literature to do exact work. Thus, in connection with *Nycticorax caledonicus*, they wrote: "We apparently do not know whether the rufous Night Heron is resident and breeding in New Caledonia, or whether it is only an occasional visitor. Dr. Sarasin seems to have seen it only once, though he says there is a series in the Museum at Noumea." The fact that it was obtained by Forster in 1774 should have suggested it was more than an accidental visitor, while reference to the *Catalogue* of Birds in the British Museum, Vol. XXVI., would have shown that many writers on New Caledonia had noticed it, and to quote the first one I looked up, Messrs. E. L. and L. C. Layard write (*Ibis* 1882, p. 531): "This Night Heron is found sparingly wherever we have been. . . . It may be that they [white occipital plumes] are only assumed during the breeding-season, and that they breed only in the north of the island."

Again, on p. 287, Rothschild and Hartert still persist in the use of the preoccupied and invalid generic name *Carpophaga*, and on p. 295 there appears—

Monarcha chalybeocephalus chalybeocephalus, as the original reference appearing:

"*Muscicapa chalybeocephalus* Garnier, *Voy. Coquille Zool. Atlas*, pl. XV., fig. 1 (♀), 1.2, p. 589 (1826-1828—New Ireland)." Had the writers continued their reference to my *List of the Birds of Australia*, they would have seen that on p. 190 I used as the species name *alecto* Temminck 1827. Had they continued their investigation they would have seen that in the *Austral Avian Record*, Vol. II., 1913, pp. 49-54, I gave the exact dates of publication of the plates of the birds figured in the *Voy. Coquille* in conjunction with the data regarding the text already provided by Sherborn. Consideration of that

THE BIRDS OF AUSTRALIA.

article specially prepared to obviate errors such as here perpetuated by Rothschild and Hartert would have indicated three errors in the quotation given by them.

The page 589 did not occur until 1829 (Nov. 21), while the plate XV. was not published till the end of 1828 (Nov. 29), and Garnot is the spelling of the author's name to me. This extraordinary error in connection with this author's name has persisted in Rothschild and Hartert's mind for many years, as it appears in the former's *Monograph of the Paradiseidæ* prepared many years ago. This suggests some lack of care in connection with their work and does not convince observers as to the accuracy of their statements in other matters.

In a preceding paper similar inaccuracies occur, while at the same time they comment upon the fact that I failed to note that I had previously designated the type locality of a bird.

Again it might be observed that in the present paper they describe a new species of *Tyto* from a solitary specimen after having devoted four and a half pages of the *Nov. Zool.* as recently as June, 1913 (Vol. XX., pp. 280-284) to the extraordinary variation they supposed to occur in Australian forms of *Tyto*. I will deal with that article in its proper place shortly, but I here note it to show the inconsistency present in their work. The inaccurate statements they then made I will prove in full under the genus *Tyto* in this work.

To revert to the Black Duck, when compared with Australian birds those from New Zealand average larger, so that a different name must be used. I therefore class all the Australian birds under the name proposed for the Western form, which I differentiated and which may yet need recognition.

The bird figured and described was collected at Broome Hill, South-west Australia, on the 15th of September, 1906, by Mr. Tom Carter.

GENUS—VIRAGO.

VIRAGO Newton, Proc. Zool. Soc. (Lond.) 1871, p. 651 ... Type *V. castanea*.

SMALL Anatine birds with long bills and other characters generally agreeing with those of the genus *Anas*.

The bill is not longer than the head, depressed and narrow, its width less than its depth at base of culmen which is less than half its length; the serrations on the edges of the upper mandible just visible, the edges being strictly parallel.

The tail is more than one-third the length of the wing, nearly approaching half its length in some cases.

The metatarsus is just exceeded by the middle toe in length, but generally just equals the length of the culmen. Superficially the bill in this genus is more compressed and comparatively narrower than *Nettion*: the nostrils placed nearer the base of the bill. The legs and feet are shorter and a different coloration is easily observed.

I note this as Salvadori placed these birds in the genus *Nettion*, and then admitted *Querquedula*, whose coloration fairly agrees in style with that of typical *Nettion*, while these absolutely differ.

The name of this genus was given by Newton on account of an anatomical discovery that the females of the type species agreed in having an anatomical peculiarity otherwise only found in, and peculiar to, the males of this family of birds. This "discovery" seems to have been based on an erroneous supposition that the females could be guessed by coloration, and it seems that Newton did not sex the birds he examined, but simply *thought* they were females. At any rate, Newton's discovery does not appear to have been confirmed, and Ramsay concluded that Newton's "females" of the bird he called *Virago castanea* were really males of the next species, *V. gibberifrons*. I use Newton's generic name, as externally those two species differ from *Nettion* or *Anas*, the two nearest related genera.

Key to the Species.

- A.* Head uniform glossy green; under-surface
deep chestnut *V. castanea*, p. 97.
- B.* Head brown speckled with white; under-
surface ochreous buff *V. gibberifrons rogersi*, p. 102.



H. Grönvold. del

Witherby & Co.

$\frac{1}{3}$ NETTION CASTANEUM.
(TEAL).

VIRAGO CASTANEA.

GREEN-HEADED TEAL.

(PLATES 211 AND 212.)*

MARECA CASTANEA Eyton, Monogr. Anatidæ, p. 119, 1838; New South Wales.

Mareca castanea Eyton, Monogr. Anatidæ, p. 119, 1838 (N.S.W.); Gray, Genera Birds, Vol. III., p. 614, 1845 (N.S.W.); Reichenbach, Synops. Av. Natat., pl. 86, figs. 2330-31, 1850 (N.S.W.).

Anas punctata (not Burchell 1822) Lesson, Traité d'Ornith., p. 634, 1831 (Java ? ?); Gould, Birds Austr., Vol. VII., pl. 11, 1845 (N.S.W. and Tasmania); ? Sturt, Narr. Exped. Centr. Austr., Vol. II., App., p. 57, 1849 (Central Australia); Gould, Handb. Birds Austr., Vol. II., p. 365, 1865 (N.S.W. and Tasmania); Schlegel, Mus. Pays-Bas, Vol. VI., Anseres, p. 47, 1866; Müller, Proc. Zool. Soc. (Lond.) 1869, p. 280; Newton, *ib.*, 1871, pp. 649, 650 (pt.) figs. 1-2; Ramsay, Proc. Linn. Soc. N.S.W., Vol. I., pp. 195, 216, 219, 1877 (Australia, Tasmania).

Mareca punctata Gray, List Birds Brit. Mus., pt. III., p. 134, 1844; Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 650, 1856; Gray, Handl. Gen. Sp. Birds, pt. III., p. 81, 1871 (N.S.W., W.A., Tas.); Heine & Reichenow, Nomencl. Mus. Hein., p. 345, 1890.

Querquedula punctata Lichtenstein, Nomencl. Av. Mus. Berol., p. 102, 1854 (New Holland).

Casarca castanea Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 649, 1856.

Anas castanea Newton, Proc. Zool. Soc. (Lond.) 1871, p. 649; Ramsay, Proc. Linn. Soc. N.S.W., Vol. II., p. 200, 1878; *id.*, *ib.*, Vol. III., pp. 38, 154, 1878; Legge, Pap. and Proc. Roy. Soc. Tasm., 1886, p. 244, 1887 (Tas.); *id.*, *ib.*, 1887, p. 97, 1888 (Tas.); Ramsay, Tab. List Austr. Birds, p. 22, 1888 (Australia); ? North, Austr. Mus. Cat., no. 12, p. 341, 1890; Kearland, Vict. Nat., Vol. VII., p. 43, 1890.

Nettion castaneum Salvadori, Cat. Birds Brit. Mus., Vol. XXVII., p. 252, 1895 (Australia, etc.); Hall, Key Birds Austr., p. 107, 1899 (Australia); Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 1037, 1901 (Australia); A. G. Campbell, Emu, Vol. II., p. 209, 1903 (King I.); Carter, Emu, Vol. III., p. 212, 1904 (N.W. Cape); Littler, *ib.*, p. 216, 1904 (Tas.); Legge, *ib.*, Vol. IV., p. 107, 1905 (Tas.); Hall, Key Birds Austr., 2nd ed., p. 107, 1906 (Australia); Hill, Emu, Vol. VII., p. 23, 1907 (Vic.); Mattingley, Vict. Nat., Vol. XXV., p. 65, 1908; Gibson, Emu, Vol. IX., p. 76, 1909 (S.W.A.); Hall, *ib.*, p. 78, 1909 (Vic.); Crossman, *ib.*, p. 86, 1909 (Cent. W.A.); Hall, *ib.*, p. 133, 1910 (Eyre Peninsula); Littler, Handb. Birds Tasm., p. 221, 1910 (Tas.); North, Austr. Mus. Spec. Cat., no. 1, Vol. IV., p. 77, 1913 (Australia).

* These Plates are lettered *Nettion castaneum*.

THE BIRDS OF AUSTRALIA.

Nettion castaneum Mathews, Handl. Birds Austral., p. 35, 1908; *id.*, Nov. Zool., Vol. XVIII., p. 238, 1912; Orton and Sandland, Emu, Vol. XIII., p. 76, 1913 (W.A.).

Virago castanea Stejneger, Stand. Nat. Hist. Birds, Vol. IV., p. 145, 1885 (Aus.).

Virago castanea castanea Mathews, List Birds Austral., p. 91, 1913 (East Australia).

RANGE. New South Wales; Victoria; Tasmania; South Australia; South and Mid-west Australia.

Adult male. Upper-surface, including the lower hind neck, back, scapulars, rump, and upper tail-coverts dark brown, the feathers on the upper back and short scapulars edged with chestnut, the rump darker and more uniform, upper tail-coverts glossed with metallic green; lesser and median upper wing-coverts and long innermost secondaries olive-brown like the bastard-wing, primary-coverts and quills, the latter darker at the tips, the outer greater coverts broadly tipped with white becoming narrower and inclining to buff on the inner ones; secondaries velvety black on the outer webs, olive-brown on the inner ones, tipped with white and with a subterminal line of buff, two of the inner secondary-quills have bright metallic copper on the outer webs which stand out in bold relief; tail-feathers olive-brown with slightly paler edges; entire head and neck dark metallic green with coppery reflections on the sides of the nape; lower fore-neck, breast, sides of neck, sides of body, and abdomen rich chestnut with black ovate centres to the feathers which become larger on the sides of the body; a white patch on each side of the rump, some of the feathers having black tips; under tail-coverts black glossed with green; axillaries pure white; under wing-coverts blackish, some of the inner ones tipped with white, greater under wing-coverts ash-brown like the quill-lining. Bill black, slightly mottled with flesh-colour on the under-surface; iris blood-red; feet slaty black. Total length 410 mm.; culmen 42, wing 223, tail 103, tarsus 41.

Adult female. Similar to the adult male, but with the white on the flanks and abdomen more pronounced. Wing 209, tail 95, tarsus 39.

Immature. Quite different from the adult by being olive-brown above with whitish edgings to some of the feathers and buff to others: the wing-speculum differs in being metallic green and black instead of metallic copper; head brown intermixed with white, the white becoming more extensive on the sides of the face and sides of the neck, and uniform buffy-white on the throat; fore-neck and breast brown with buff margins to the feathers; sides of the body olive-brown broadly fringed with whitish, giving a very coarse pattern; middle of abdomen less distinctly marked; under tail-coverts olive-brown with paler edges; axillaries and under wing-coverts similar to those of the adult.

From the material in hand it seems that, from the immature described above, the next stage is generally much darker above; the throat becomes streaked and the top of the head glossy; the breast begins to show some of the redness of the adult, and the rest of the under-surface becomes darker.

Nestling (seven days old). Sooty-black above with a longitudinal white line on each side of the back and white streaks on each side of the body; a pale line above and below the eye, also a blackish line through the eye; under-surface whitish with a tinge of buff on the cheeks and fore-neck. The nestling of this bird is much darker than that of "*gibberifrons rogersi*."

Nest. "Usually in a hollow tree, but occasionally on the ground in grass or other herbage in the vicinity of water; furnished with a plentiful supply of down. Should the nest be on the ground, fine grass is sometimes intermixed with the fuscous-coloured down, each particle whitish in the centre, and with light-

GREEN-HEADED TEAL.

coloured tips. Apparently slightly darker than the nest-down of the Grey Teal. Dimensions : inside, 5 inches across by $2\frac{1}{2}$ inches deep " (Campbell).

Eggs. "Clutch, nine to ten usually, thirteen maximum ; elliptical in shape ; texture of shell fine ; surface glossy and greasy ; colour, rich cream. Dimensions in inches : $1.9-2.14 \times 1.45-1.52$ " (Campbell).

Breeding-season. "June to December" (Campbell).

THE confusion between this and the succeeding bird has not yet been unravelled to my satisfaction. A full discussion will be given in connection with the following bird, and it should be here indicated that probably some of the references above given refer to the next species, but that there is no present means of decision. The range and life-history of the two are so confused that I cannot fix definitely to either any of the accounts. I have generally concluded that all recent records of *Nettion* (or *Nettium*) *castaneum* refer to the Green-headed Teal, but of this I cannot even be certain, as I will show later. Early records undoubtedly refer to either, and I have placed them in connection with this species simply because it is absolutely impossible accurately to assign them.

Mr. J. W. Mellor has written me: "This teal is not common in South Australia, and in all my wanderings and expeditions I have never shot a male bird with the metallic green head, which I believe is the chief characteristic: in the breeding-season they are here, as I have authentic information from good sources, but if they were common we should undoubtedly see them in the markets and poulterers' shops just before or after the close season, but this is only occasionally the case."

Mr. Tom Carter's notes read: "This species seems to me to be the salt water Teal, as I have not seen them on fresh water. In a large lagoon of sea water surrounded by mangroves near the North-west Cape, there was always a flock or two of these birds. They evidently bred there, as young in down were noted in July, 1900. In June, 1901, at this locality, I shot three birds and skinned what seemed to be a handsome male, as the glossy green head and neck were most pronounced as well as the rich brown breast, but it was an undoubted female on dissection. (See *Emu*, Vol. II., p. 80, where by a printer's error, 'most' is printed 'not'). One of the other birds that I imagined was a female because it had not the green head and neck proved to be an immature male on dissection. I have noted this species on the Salt River (Pallenup River) to the south-east of Broome Hill ; and on Lake Muir, which is also salt water, it occurs in thousands. I have visited Lake Muir in April and December, when nearly ALL the birds seemed to have green

THE BIRDS OF AUSTRALIA.

heads and necks. One of a pair shot on the Pallenup River on Sept. 27, 1910, was a male with green head and neck. The other bird which had not a green head escaped. I take this species to be quite distinct from *N. gibberifrons*."

A. G. Campbell (*loc. cit.*): "This and the preceding species (*Anas superciliosa*) find much of their food in the kelp on the seashore, and in the shallow water among rocks. They also frequent inland lagoons in company with the other swimmers enumerated, all of which nest on the island (King Island)."

North (*Austr. Mus. Spec. Cat.*, no. 1, Vol. IV., p. 77, 1913) concluded: "Essentially it is a coastal species, frequenting salt-water lakes and arms of the sea more than inland rivers and lagoons, the latter of which are the favourite haunts of its lesser congener, the Slender or Grey Teal (*Nettion gibberifrons*). Often the two species may be met with associated together in one large flock near the coast."

In the same place Mr. George Savidge's notes read: "The Chestnut-breasted Teal (*Anas castanea*) was fairly plentifully dispersed about the large swamp on the Lower Clarence River District; the open water and river courses do not seem to attract it so much as purely swamp country. It is a powerful flier, and looks much larger on the wing than when examined in one's hand: the flesh is tender and excellent eating."

Again, Keartland contributed to the same work: "The Chestnut-breasted Teal (*Nettion castaneum*) is usually found in small flocks or pairs, but are not very numerous anywhere. They prefer fresh water lagoons or rivers. I have seen a few at King's Island and also at Heidelberg, Victoria. Some time ago I was anxious to ascertain the difference in weight between these birds and the Common Teal (*Nettion gibberifrons*). The Chestnut-breasted Teal averaged three pounds one ounce per pair, whilst the others only averaged two pounds three ounces. I weighed ten pairs of each species. Gould was in error when he described this bird as the Common Teal in its nuptial dress. When once it assumes its gay livery it never changes back to the sombre garb again. The female is about the same weight as the male, but is somewhat darker in colour than the Common Teal."

Dr. Lonsdale Holden's notes are printed by North (*loc. cit.*): "On the 9th September, 1886, I saw about a dozen drakes of *Anas castanea* in fine plumage, and two or three ducks of the same species, in a swamp on Circular Head Peninsula (Tasmania), and approached them within fifteen yards. The drakes have lustrous green heads and necks, and a conspicuous white mark on the upper wing-coverts: the ducks are

GREEN-HEADED TEAL.

greyish-brown. On the 1st November, 1886, I found a Teal's nest with eleven fresh eggs, on a swampy plain beyond Montague; the nest was in a clump of earth growing dwarf tea-tree, and surrounded by shallow water; little but bare ground formed the bottom of the nest, but was thickly lined with black down with white centres. We flushed the bird from it as we rode across the plain."

Dr. W. Macgillivray says this is the coastal and *rogersi* the inland bird.

The adult male figured was collected in Tasmania in December, 1862, and the female described above, on the Tamar River in the same Island on the 21st of July, 1912, by Mr. H. C. Thompson, of Launceston, who very kindly gave me the specimen.

This female is a most interesting bird, as showing (in conjunction with Carter's female, see *ante*) that it is very like the male. Mr. Carter also mentions that in the flocks he saw most of the birds were green headed. Dr. Lonsdale (*ante*) saw about a dozen drakes and only two or three ducks (immature?). It is quite possible that collectors have called ALL green-headed birds males without dissecting them, being carried away by the belief that only the male had a green head.

VIRAGO GIBBERIFRONS ROGERSI.

SLENDER OR GREY TEAL.

(PLATE 212.)*

- NETTION CASTANEUM ROGERSI* Mathews, Austral Av. Rec., Vol. I., p. 86, 1912; North-west Australia.
- Anas punctata* (part) Gould, Handb. Birds Austr., Vol. II., p. 365, 1865.
- Anas gibberifrons* Ramsay, Proc. Linn. Soc. N.S.W., Vol. II., p. 209, 1877; Sclater, Proc. Zool. Soc. (Lond.), 1880, pp. 452, 519, 535; *id.*, *ib.*, 1882, p. 453, pl. 33; Ramsay, Proc. Linn. Soc. N.S.W., 2nd Ser., Vol. I., p. 1151, 1886; *id.*, Tab. List Austr. Birds, p. 22, 1888; North, Austr. Mus. Cat., no. 12, p. 342, 1890; Kearnland, Vict. Nat., Vol. VII., p. 46, 1890; North, Trans. Roy. Soc. S.A., Vol. XXII., p. 190, 1898 (N.W.A.); Hartert, Nov. Zool., Vol. XII., p. 206, 1905 (N.W.A.).
- Nettion gibberifrons* Salvadori, Cat. Birds Brit. Mus., Vol. XXVII., p. 255, 1895 (part); Hall, Key Birds Austr., p. 107, 1899; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 1039, 1901; Carter, Emu, Vol. III., p. 212, 1904 (N.W. Cape); Milligan, *ib.*, Vol. IV., p. 11, 1904 (S.W. Austr.); Mellor, *ib.*, Vol. V., pp. 1, 6, 1905 (N.S.W.); Hall, Key Birds Austr., 2nd ed., p. 107, 1906; Berney, Emu, Vol. VI., p. 157, 1907 (N. Queensland); Batey, *ib.*, Vol. VII., p. 14, 1907 (Victoria); Austin, *ib.*, p. 79, 1907 (N.S.W.); Hall, *ib.*, Vol. IX., p. 78, 1909 (Vic.); Batey, *ib.*, p. 244, 1910 (Vic.); Mathews, Emu, Vol. X., p. 107, 1910 (N.W.A.); Broadbent, *ib.*, p. 245 (Queensland); Littler, Handb. Birds Tasm., p. 223, 1910 (Tas.); Ogilvie-Grant, Ibis 1910, p. 174 (W.A.); Carter, *ib.*, p. 656 (W.A.); Stone, Emu, Vol. XII., p. 121, 1912 (Vic.); Mathews, Nov. Zool., Vol. XVIII., p. 238, 1912; White, Emu, Vol. XII., p. 183, 1913 (S.A.); North, Austr. Mus. Spec. Cat., no. 1, Vol. IV., p. 79, 1913.
- Nettion gibberifrons* Ingram, Ibis 1907, p. 395 (N. Territory); Mathews, Handl. Birds Austral., p. 36, 1908; White (S. A.), Emu, Vol. XIII., p. 22, 1913 (S.A.); Orton and Sandland, *ib.*, p. 76, 1913 (W.A.); White, *ib.*, p. 124, 1914 (? Vic.); Macgillivray, *ib.*, p. 147 (N. Queensland); Barnard, *ib.*, Vol. XIV., p. 41, 1914 (N. Terr.).
- Nettion castaneum rogersi* Mathews, Austral Av. Rec., Vol. I., p. 86, 1912 (North-west Australia).
- Virago castanea rogersi* Mathews, List Birds Austr., p. 91, 1913.
- Virago gibberifrons* White (S. A.), South Austr. Ornith., Vol. I., p. 11, 1914 (S.A.).
- DISTRIBUTION. Australia; Tasmania.

* The Plate is lettered *Nettion rogersi*.



H. Grönvold, del.

Witherby & Co.

$\frac{1}{3}$ NETTION ROGERSI.
(GREY TEAL).

$\frac{1}{3}$ NETTION CASTANEUM.
(TEAL).

SLENDER OR GREY TEAL.

Adult male. Back and scapulars olive-brown with buffy-white edgings to the feathers; the rump darker and more uniform; lesser and median wing-coverts uniform olive-brown like the bastard-wing, primary-coverts and quills, the latter darker at the tips; outer greater wing-coverts above broadly tipped with white, becoming white on the inner ones; wing speculum composed of velvety black and dark metallic blue-green, bordered by a broad band of white on one side and a narrow one on the other; tail-feathers olive-brown with pale edges; head dark brown minutely speckled with white; sides of face and sides of neck whitish minutely speckled with brown; chin and throat uniform white; breast ochreous-buff with circular bars of brown; sides of body olive-brown with whitish margins to the feathers; abdomen pale brown with an ochreous tinge, as also the under tail-coverts; axillaries pure white; under wing-coverts dark brown, the median series tipped with white, the greater series olive-grey like the quill-lining. Bill: upper mandible leaden blue, nail black; lower mandible leaden brown with a yellowish-white bar near the tip; iris reddish-brown; tarsi and feet leaden brown. Total length 450 mm.; culmen 41, wing 206, tail 85, tarsus 36.

Adult female. Similar to the adult male.

Nest. Placed in a hole in a tree.

Eggs. Clutch, five to twelve; ground-colour creamy; surface smooth and slightly glossy. Axis 50 mm.; diameter 35-36. (Taken on the coast near Rockhampton, Queensland).

Breeding-season. Practically all the year round, after any rain.

As stated in connection with the preceding species the references are too confused to admit of accurate separation. The present bird was generally accepted to represent the female of the preceding, and the differences between the two are not yet well known. I shall discuss the exact relationships further on, and here reproduce the field notes written as for the present species.

Mr. Tom Carter writes: "This is one of the commonest ducks in the Mid-west, mostly breeding in hollow spouts of White Gum trees. I have examined scores of nests with eggs in such situations, and shot specimens feeding in the adjacent water, which were of both sexes, and undoubtedly breeding, but I never saw one with the green head and neck of *castaneum*. Although on different occasions in the sixteen years spent in the Mid-west I have seen many thousands of grey teal on flooded claypans, river pools and swamps of fresh water, I never saw one with a green neck. The birds appear to lay after any heavy rains, no matter what the month is. In the South-west the grey teal is still a fresh water bird. Every year one or more broods of young are reared in the paddock where my house 'Wensleydale' is situated. The parent birds bring the young to a large stock tank near the house, and being very tame can be well observed. I have not seen a teal with green neck here, although many times the parent birds accompanied the young. They seem to be later breeders than *Anas superciliosa*, as Oct. 9, 1908, a pair brought eight young in down to the tank. Oct. 23, 1908. Noted four

THE BIRDS OF AUSTRALIA.

young birds flying with the adults. Nov. 10, 1907. Half-grown young on tank. Dec. 14, 1905. Brood of small young in down with parents on tank. I have seen 26 at a time on stock tank, but never a green head."

Mr. J. W. Mellor adds: "This is our common teal in South Australia, and is sent into the market in thousands in Adelaide: the colour of the birds does not differ all the year round. I have noted the irides of the old birds a deep blood-red. They love to go in large flocks, and in some instances where they are undisturbed they congregate in thousands in a mob; their flight is very swift indeed, and the call of the duck a peculiar little note, cack-cack-cack, repeated in quick sharp succession for about 6 or 8 times, this being especially noticeable while flying swiftly through the air at night: the drake has a sharp little whistle, repeated in a jerky fashion in answering his mate. While flying, a conspicuous point one notices is the white on the quill-feathers of the wing which shows out prominently."

Mr. Sandland writes: "Very plentiful on tanks and very seldom one goes round the tanks without seeing a few. Nested in 1903-1904 (December to February) after an extraordinary thunderstorm, when over six inches of rain fell and there was surface-water for months. Flappers were to be seen in hundreds on every swamp near Balah, South Australia."

Berney, regarding North Queensland, wrote (*Emu*, Vol. VI., p. 157, 1907): "Although of this species and the former (*Anas superciliosa*) the Teal is more commonly seen, I have only on one occasion come across evidence of its nesting here. On the 12th April, 1906, I saw an old bird with six ducklings in the down. They will average a pound weight, going up to a pound and a quarter."

Macgillivray (*Emu*, Vol. XIII., p. 147, 1914) added: "This Duck was very numerous on the lakes at Sedan and Byromine, N. Queensland, and nesting freely in the hollow trees. The nests contained from five to twelve eggs, the average clutch being seven or eight. Eggs were nearly all hard-set at the end of March, 1910."

North's remarks (*Austr. Mus. Spec. Cat.*, no. 1, Vol. IV., p. 80, 1913) read: "Although found in Northern Australia, the Slender Teal is more abundantly distributed throughout the eastern and south-eastern portion of the continent. In New South Wales it is without exception the most common species of the family *Anatidæ*, and is met with throughout the year. It frequents the same situations as its congener *Nettion castaneum*—rivers, swamps and lagoons both near the coast and inland. Thousands of these birds are shot every year, but without any apparent diminution of their numbers, judging by the enormous flocks to be seen inland,

SLENDER OR GREY TEAL.

especially after a heavy rainfall. They are exceedingly tame and easy to approach before disturbed by too much shooting."

T. P. Austin (*loc. cit.*) noted: "The Grey Teal (*Nettion gibberifrons*) is probably the most common of all Ducks; it is usually found in large flocks and is tolerably tame. Their call-note when flying is usually a cackling squawk, but when swimming it is a single note, which is more of a squeak uttered at intervals of a few minutes. They are moderately fast fliers, but as a rule do not fly as fast as some of the other Ducks."

In the same place Keartland's notes are: "The Common Teal (*Nettion gibberifrons*) may be found in all parts of Australia. It matters little whether the water is fresh or salt, the Teal is equally at home in fresh-water creeks, lagoons, rivers, and swamps, or on the seacoast and salt lakes."

At my suggestion Captain S. A. White has written a note on the relationships of this and the preceding species in the *South Australian Ornithologist*, Vol. I., pp. 11-12, 1914, which is here reprinted *in extenso*: "A discussion arose lately about these birds, and I was surprised to hear that some were still under the impression that they were but one species, and that the grey birds were the same as the Chestnut, only out of plumage or immature. Furthermore, I have been requested to express my opinion on the subject through the pages of this journal. I may state that there is not a shadow of doubt in my mind about their being two distinct species and good ones at that. My remarks are those of a field ornithologist. I leave the osteology of these birds to more able minds. Firstly, the Eastern Teal, Mountain Teal, or Chestnut-breasted Teal, whatever you like to call it in the vernacular, known to science as *Virago castanea* (*Mareca castanea* Eyton, *Monograph Anat.*, p. 119, 1838, N.S.W.) and described by John Gould as *Anas punctata* (*Birds of Australia*, Vol. VII., pt. II., 1845), is a heavier bird than the grey species, and not nearly so common. One could safely say, as far as South Australian waters are concerned, that for every one of the Chestnut species one would see a hundred or more of the grey birds. It is true a few birds may be seen mixed up with the vast flocks of Grey Teal, but this I have always put down to the fact of their having been driven off from their kind and their haunts by sportsmen and other factors, and for the time have attached themselves to the ranks of their grey cousins. This I think I can prove later on.

"*V. castanea* is a beautiful bird in full plumage, especially the male bird, the bronzy-green head and neck shining in the bright sunlight with great brilliance. The female always shows the rufous tinge more or less

THE BIRDS OF AUSTRALIA.

on the breast. These birds do not move about in large flocks in South Australia; about a dozen is as many as I have seen in one locality. If they can get it they prefer a stony or gravelly beach to the soft muddy swamps. I have seen them swimming in deep water off a rocky shore, but have never seen them diving for their food, although I have an idea they do so. They have a great liking for resting on boulders and rocks: thus, I think, the origin of the name 'Mountain Teal.' About 16 years ago, during a big drought in the interior, thousands of ducks visited the Reed-beds, and amongst them was a fair sprinkling of the teal under notice. This is the only time I have known them to visit the swamps here. They seem to prefer the large open waters, and frequent the rocky shores if there be such. There is no doubt John Gould took these two species to be one, for he speaks of having met them in great numbers (*Handb. Birds Austr.*, Vol. II., p. 365). He goes on to say that it is very rare that a male is killed in the nuptial dress, and he is induced to believe that it is not assumed until the bird is two or three years old. One can understand Gould must have been very puzzled, seeing so few of the Chestnut-coloured birds in comparison to the Grey birds.

"*Virago gibberifrons* nest in great numbers in the interior during wet seasons, many hundreds nesting together amongst the salt bush and *Polygonum* swamps, but I have never heard of the Chestnut species nesting with them. Only a few nests of the latter have ever come under my notice, and they were placed in hollow limbs of trees. I have seen many nests of Grey Teal in trees, and here at the Reed-beds they once nested nearly every year, but never once did I see *V. castanea* nesting. In February 1912 my wife and I made a trip to Lakes Alexandrina and Albert, and spent some little time on the waters there, making very many useful observations. We were very fortunate in having the services of Mr. Fred. Ayres, a man who has passed the better part of his life shooting game for the market, and he has a wonderful store of knowledge pertaining to the habits of the wild-fowl. I was very pleased to find that my observations were confirmed in reference to these teal. While we were on the lakes and amongst the swamps along their shores we saw vast flocks of *V. gibberifrons*, but not one *V. castanea*, and when I mentioned this to our guide he at once said, 'If you want Mountain Teal we must steam over to the rocky shores at the other side of the lake.' And I found this to be correct. Seeing that these birds have distinct habits and that both have been found breeding, the Grey Teal in vast numbers without a single Chestnut bird amongst them, surely this alone must dispel any doubt upon the subject."

SLENDER OR GREY TEAL.

Gould's account, noted by Capt. White above, had better be here transcribed. "The *Anas punctata* is universally diffused over the southern portion of Australia; it is also equally numerous in some parts of Tasmania. It is not migratory, but may be met with during every month of the year. . . . Like the Wild Duck and Teal of Europe, this bird inhabits rivers, brooks, lagoons, and ponds, both inland and near the sea. It is a true grass-feeder, and is one of the best Ducks for the table found in the country. When surprised it rises quickly, but is less active than the European Teal; it is, however, a bird of powerful flight. I frequently met with it in vast flocks while ascending the little-visited rivers of the southern part of Tasmania, particularly those which empty themselves into Recherche Bay. In these retired and solitary retreats it is much more tame than in frequented situations, and never failed to fly down the rivers over our heads as we ascended; a measure which, although at the first view it appears to be that of flying into the danger it wished to avoid, was in fact the readiest means of escaping; for had it taken the opposite course it would have required great exertion to surmount the impenetrable forest of high trees, rising perpendicularly from the water's edge, in which these short and sluggish rivers usually terminate. It is very rare that the male is killed in the nuptial dress, and I am induced to believe that it is not assumed until the bird is two or three years old; after the breeding-season the sexes are alike in plumage, and for at least nine months of the year there is no difference in their outward appearance. . . . There appear to be two very distinct races of this bird, one of which is much larger than the other; so great in fact is the difference in this respect in specimens from various parts of the country, that the idea presents itself of their being really distinct species. The smaller race inhabits Tasmania, the larger the western and southern portions of Australia."

This note is the first indication or suggestion of the presence of two species of Teal in Australia. In 1869, Buller described as a new species under the name *Anas gracilis* a small bird procured in New Zealand. It was immediately pointed out that this was probably the same bird described from Celebes in 1842 by S. Müller as *Anas gibberifrons*, and also that the same bird occurred in Australia; other authorities contended it was the immature or female of *Anas castanea* (Eyton).

When Ramsay drew up his List of Australian Birds (*Proc. Linn. Soc. N.S.W.*, Vol. II., 1877) he only admitted one form on p. 200, as *Anas* (*Virago*) *castanea*. On p. 209 he, however, gave the following note:—

"*Anas gibberifrons*. I have never met with this species, although said to have been obtained both in North and South Australia,* which I think

THE BIRDS OF AUSTRALIA.

very improbable. I here transcribe Mr. Buller's description (of *A. gracilis* Buller, *Ibis* 1869, pp. 41-2) for the benefit of our readers, trusting should any of them meet with the bird in the flesh, they will not fail to record the *full particulars* of its capture in our *Proceedings*. **Ibis* 1869, note pp. 42, 380; also *Ibis* 1870, p. 459."

Later Ramsay recognised the two species and admitted both in the Tabular List in 1888. The differences between the two species was, however, not clearly defined, although it was due to Sclater's notes on Australian birds in the Zoological Gardens, London, that the two were commonly admitted.

When Salvadori monographed the Ducks in the *Catalogue* of the Birds in the British Museum, Vol. XXVII., he admitted his inability to define the two species, recognising on p. 252 *Nettion castaneum* with a range of Australia, New Zealand, and New Caledonia (?) and as a straggler in Celebes and Java, and on p. 254 (*Nettion gibberifrons*) he wrote:

"This species is absolutely similar to the supposed female of *N. castaneum*, both in colour and dimensions, so that I am utterly unable to distinguish it; still it seems quite certain that they are not identical, as birds in the plumage of *Anas gibberifrons* have bred, and, perhaps, are still breeding, in the Zoological Gardens of London. . . . We must wait for additional information in order to settle the question of the specific differences between *N. castaneum* and *N. gibberifrons*. *Hab.* Celebes, Java, Timor, Flores, Sumba, and if *N. castaneum* be not distinct, also Southern New Guinea, Australia, New Zealand and New Caledonia."

Such admission from such an accurate investigator as Count Salvadori shows how difficult a subject this is to deal with from examination of skins. As will be later noted, one Australian ornithologist solved the problem by weighing the dead birds, but this method cannot be applied to bird skins!

Hall, in his Key, quoted Salvadori's first remark without any comment.

Campbell commented (*Nests and Eggs*, p. 1039): "Field observers and collectors now have no doubt about the existence of this second variety of Teal in Australia. Some systematists appear to entertain a doubt." Then he quoted Count Salvadori's remarks and added: "Mr. G. A. Kearnland, having weighed two species of Teal in the flesh, has kindly furnished me with the average results:—Chestnut Teal: male 1 lb. 9 oz.; female 1 lb. 8 oz. Grey Teal: male 1 lb. 2 oz.; female 1 lb. 1 oz. This is evidence that seems to speak for itself. The Count could find no difference between the females. According to the above figures there is nearly a third difference in the weights."

SLENDER OR GREY TEAL.

Writing upon the Ducks of Victoria, Hall (*Emu*, Vol. IX., p. 78, 1909) gave the following notes: "*Nettion castaneum*. As with the Black Duck it is the earliest of the local species to pair and nest. In their feeding-grounds they prefer plenty of mud in which to paddle their bill. They feed largely upon a small red beetle, which they pick from the blades of water weeds. No liking is shown for spiders.

"*Nettion gibberifrons*. I could not decide the species when on the wing."

Under the heading Teal (*Nettion castaneum* Eyton), Littler (*Handb. Birds Tasm.*, p. 222, 1910) recorded: "Doubtless there are but few who are aware that two species of Teal exist in Tasmania, most being under the impression that the species so much in evidence in a number of localities during the 'open' season is the only one found here. The species under review is on the mainland frequently called the Mountain Teal. It is a scarce species in Tasmania, or at least the males are but seldom procured. I have inspected specimens from the Lake district and am informed on good authority that it frequents several localities on the North-east coast; doubtless it is also to be found in the southern portion of the island.

"To verify my own observations concerning the two species, I forwarded to Mr. A. J. Campbell a set of questions, which I now give, with his answers appended thereto, thinking they may be of interest:—

"Q. Does the male of the Chestnut-breasted Teal retain its black head and neck and chestnut breast during the non-breeding season?

"A. Yes. [I believe that once the male of this species dons his full livery he never throws it off; but I also believe that many males breed before they have attained full livery.]

"Q. Is the breeding plumage of both sexes of the Grey Teal similar to the non-breeding plumage?

"A. Yes.

"Q. Are there any outward differences between the female of the Chestnut-breasted Teal and the female of the Grey Teal?

"A. None, except in weight. Chestnut, $1\frac{1}{2}$ lbs.; Grey, $1\frac{1}{8}$ lbs.

"Q. Are both sexes of the Grey Teal similar in appearance?

"A. Yes."

A careful study of the preceding will show that however easily field ornithologists may have differentiated the two species, not one of them had devised a method of proving his observations, as Kearland's method was practically impossible. It may also be noted that no two agree as to the constant habits of the different species, for whereas Mr. Tom Carter, whose field observations are absolutely reliable, recognised the Chestnut-

THE BIRDS OF AUSTRALIA.

breasted Teal as a salt-water bird ONLY, Capt. S. A. White, who is equally reliable, writing as a field ornithologist, concluded exactly the opposite. Campbell seemed surprised at the systematist's doubts, but if anyone will carefully analyse what I have collated, there should be no doubt as to the systematist's puzzle. Examination of my own material in conjunction with that which Count Salvadori studied when cataloguing the collection in the British Museum and the additional material was not sufficient to differentiate the two species. I concluded, however, that the Northern birds were probably separable and described the North-western bird thus:

"The adult male differs from the adult female of *N. c. castaneum* in being considerably lighter on the head and back, and in having the centre of the feathers on the under-surface not so dark."

In endeavouring to define the exact limits of these forms for this place, I had to start once more at the beginning as the additional material which had come to hand did not confirm my earlier disposition. I am compelled to admit that I cannot yet confidently assert that I know all about these birds and their inter-relationships. I propose, therefore, that my conclusions be considered of a tentative character only.

Meyer and Wigglesworth (*Birds of Celebes*, Vol. II., 1898, pp. 874-878) fully discussed this matter as it occurred to them. *N. gibberifrons* was described from Celebes, and after giving full details of the varied opinions, wrote:

"Our own conclusion in the matter is (1) that *N. gibberifrons* is a species perfectly distinct from *N. castaneum*, as is proved by Dr. Sclater; (2) that there is no sound evidence to show that *N. castaneum* has ever occurred outside of Australia and Tasmania."

They gave measurements of Celebes birds as follows:—

		Wing.	Tail.	Tarsus.	M.t. and claw.	Exp. culm.
2♂	184	77-80	34	45-47	34-37	
♀	182	81	34	44	35	
Unsexed ..	178-185	80	32-37	44-47	34-38	
9 Unsexed ..	172-190	77-89	32-36	44-51	34-38.5	

In the British Museum there is quite a nice series from Celebes and E. Timor, the measurements of which are as follows:—

				M.t. alone.	Exp. culm.	Breadth.
Makassar ♂	..	192	34	39	37	× 16.5
Celebes 3 specs.	..	182-185	33-35	38	33-36	× 14-16
Flores ..	..	200	37	39	37	× 15.5
E. Timor 3 ♂	..	186-200	36-37.5	38-39	36-37	× 12-16
E. Timor 4 ♀	..	173-199	34-37.5	38-40	34-37	× 12-14

SLENDER OR GREY TEAL.

These figures appear to me very instructive, as, so far as is known, no green-headed birds occur on the Islands north of Australia, consequently these must all be referable to the Grey Teal. Celebes is the type-locality and we notice there is variation there, but it might be suggested, as there is only one sexed male and three unsexed all smaller, that the latter may be females and therefore smaller. The East Timor series, however, dismisses that doubt, as all the seven were collected and sexed by the same man, the variation is seen well, both sexes varying equally, the females being as large as the males. This disposes of one theory that the males were larger than the females.

I have given the width of the bill, as it seemed at times that the bill was longer and thinner in certain cases, but here again the East Timor series settled that theory, both males and females having equally long and thin or short and thick bills without any apparent difference. Other features varied also, as the metatarsal length. I have laid stress on measurements as colour seemed valueless, almost all the Timor and Celebes birds being light compared with a very dark supposed female of *N. castaneum* from Tasmania, but one Celebes bird was darker, and the Tasmanian bird was unique in its dark colour, all other Australian birds being comparatively lighter.

The confusion existent in connection with Australian birds made it difficult to get accurate comparison, but a series from inland Western Australia, which should be unquestionably this species, according to Mr. Tom Carter's observations, gave:—

		Wing.	Tarsus.	M.t. alone.	Exp. culm. Breadth.
♂ ad.	..	194	38	40	39 × 14
ad.	..	199	38	40	37 × 14
♀ juv.	..	194	37	39	38 × 14
♂ juv.	..	198	36	38	37 × 15
♀ juv.	..	193	35	37	35 × 14

The constancy of these measurements and the steady decrease in the juveniles confirms the conclusion that there is no difference in size between male and female of this species, but simply individual variation. I regard all color variation as also individual and neither sexual nor specific.

A pair collected together in Victoria confirm this:—

♂	..	209	37	39	38 × 14
♀	..	186	37	39	38 × 15

THE BIRDS OF AUSTRALIA.

I conclude, therefore, that the Australian birds are larger than Celebes birds, in which I am in agreement with Meyer and Wigglesworth, and I use for them my subspecific name *rogersi*.

Buller named a straggler to New Zealand *Anas gracilis*, but it is possible that this specimen came from or through New Caledonia, and it is not yet determined what the New Caledonian bird is; for this reason I prefer to use the name given to an Australian bird which is more applicable.

Having decided that *N. gibberifrons* and *N. castaneum* are separable, how do they differ? I suggest that the latter species has the male and female alike in coloration when adult. Mr. Tom Carter has recorded how he sexed a perfectly plumaged green-headed bird and found it to be a female. Campbell records that the bird flushed from the nest, whence he first described the eggs, was in full nuptial plumage. It might have been a female.

I have in my collection a specimen collected and sexed in Tasmania by H. C. Thompson, and it is a female in the green-headed stage. Probably the majority of collectors have failed to sex their birds but simply placed ♂ against all green-headed birds without dissection.

I have discussed this matter with Mr. Tom Carter and he acknowledges that all the birds in the mangroves in the Mid-west were green-headed, and also huge flocks of birds, all green-headed, were constantly observed on Lake Muir.

In the green-headed stage this bird is much larger than the Grey Teal and is then quite easily differentiated. How can immatures be separated? is now the question. This is the problem and it cannot be settled by weighing birds: some more practical mode must be suggested.

The distribution of the two species would seem to show that the green-headed bird is strictly southern, the North-west Cape and north New South Wales being its northern limits, while the other species goes all over Australia and Tasmania and is the only species found north of the Tropics.

The explanation of the evolution of the green-headed species cannot be given until the plumage stages of both species are clearly understood. To this end careful collections must be made where these birds are numerous, and especially where the two species are considered to live in distinct habitats. Thus Mr. Tom Carter is confident that no Grey Teal occur with the Green-headed Teal among the mangroves near the North-west Cape, and Capt. S. A. White only recognises the Grey Teal on the swampy lowland places as above noted. I assert that no discrimination

SLENDER OR GREY TEAL.

is possible without long series being collected under the most favourable conditions. In North Queensland again the Grey Teal appears to be only found. The study of a series from this locality would tend to limit the exact variation in size and coloration due to sex and age.

I have here recognised—

Virago castanea (Eyton).

The Green-headed Teal.

Male and female alike in full adult plumage: immature plumage probably similar to adult of succeeding species.

Virago gibberifrons rogersi (Mathews).

The Grey Teal.

Male and female alike all the year round, and resembling the immature plumage: no brilliant plumage ever taken on.

The former confined to the South of Australia, ranging from North-west Cape to north New South Wales and Tasmania.

The latter ranging all over Australia, quite commonly in the North, and Tasmania.

The bird figured and described is a male and was collected at Parry's Creek, North-west Australia, on the 13th of February, 1909, by Mr. J. P. Rogers.

GENUS—Q U E R Q U E D U L A .

QUERQUEDULA Stephens, in Shaw's Gen. Zool.,
Vol. XII., pt. II., p. 142, 1824 Type *Q. querquedula*.

Also spelt—

Quesquedula Brandt, in Tchihatcheff's Voy. Sci. Altai Orient, p. 446, 1845.

Cyanopterus Eyton, Monogr. Anatidæ, p. 38, 1838
(Not *Cyanopterus* 1835) Type *Q. querquedula*.

Pterocyanea Bonaparte, Icon. Faun. Ital. Ucc. Introd.,
p. 17, 1841 Type *Q. querquedula*.

SMALL Anatine birds agreeing well in structural characters with *Anas* but smaller, and the male differently coloured. The bill agrees in structure with that of *Anas*, and is longer than the metatarsus or middle toe. The wing has the first primary longest, in *Anas* the second is slightly the longest. The tail is short. The metatarsus has a single row of scutes on the front and is shorter than the middle toe or culmen. The middle toe is longer than the metatarsus but is shorter than the culmen. The hind toe is small and narrowly lobed.

This genus, admitted in the *Catalogue* of the Birds in the British Museum, Vol. XXVII., can scarcely be differentiated from *Nettion*. The only character given is "Upper wing-coverts blue or bluish-grey" against "Upper wing-coverts not blue, but of a more or less dark grey."

Examination of specimens show that the bill in *Querquedula* is comparatively broader and deeper than in *Nettion*, and the toes a little longer.

The two genera are distinguished by American Ornithologists, but the distinction is so slight that Baird, Brewer and Ridgway (*Water Birds North Amer.*, Vol. I., p. 487, '1884) wrote: "Small, like *Nettion*, but bill longer (longer than the head), broader, less depressed, the culmen decidedly convex anteriorly, lesser wing-coverts pale dull blue: nape without a tuft." If the two genera be united, which seems inevitable to me, the name here used must be preserved as it is the oldest.

QUERQUEDULA QUERQUEDULA HUMERALIS.

EASTERN GARGANEY TEAL.

ANAS (QUERQUEDULA) HUMERALIS Müller, Verh. Nat. Gesch. Land en Volkenk, p. 159, 1842; Java.

Querquedula circia Campbell, Vict. Nat., Vol. XV., p. 151, 1899; *id.*, Nests and Eggs Austr. Birds, Vol. II., p. 1042, 1901; Hall, Key Birds Austr., 2nd ed., p. 114, 1906.

Querquedula querquedula Mathews, Handl. Birds Austral., p. 36, 1908.

Querquedula querquedula humeralis Mathews, Nov. Zool., Vol. XVIII., p. 238, 1912; *id.*, List Birds Austr., p. 92, 1913.

DISTRIBUTION. India southwards to Java; Australia (accidental).

Adult male. Crown of head dark brown narrowly edged with chestnut, fore-part of the head minutely streaked with white, becoming chocolate-brown on the fore-head; sides of the face, sides of neck, and fore-neck chocolate-brown with minute white shaft lines; chin dark brown; entire breast buffy-white barred with brown; sides of the body dusky brown barred with white; ornamental flank feathers white narrowly barred with black, the long ones broadly tipped with lead-grey; upper abdomen white, lower abdomen and vent faintly and narrowly barred with grey; under tail-coverts also white with ovate brown spots; axillaries and inner under wing-coverts pure white; lesser under wing-coverts pale ash-grey; a broad white line along the sides of the crown on to the sides of the nape which almost meets on the hind-neck; mantle and back dark brown with paler brown edges to the feathers and which become blue-grey on the rump; outer scapulars pale grey, inner ones glossy green with white shaft streaks; lesser wing-coverts uniform pale grey; greater upper wing-coverts broadly tipped with white; bastard-wing pale brown; primary-coverts also pale brown with whitish margins to the outer webs; primary-quills dark brown with white shafts and pale inner webs; secondaries pale brown with metallic green on the outer webs and white tips which form wing-bars, the inner secondaries dark brown with pale edges; upper tail-coverts dark brown with whitish edges to the feathers. Bill black; iris hazel; feet brownish. Total length 358 mm.; culmen 39, wing 190, tail 64, tarsus 31.

Adult female. Differs from the adult male chiefly by the absence of the chocolate-brown on the sides of the face and fore-neck, the dark brown spot on the chin, this part being white, the ornamental feathers on the scapulars and the fine barring on the lower abdomen. Bill blackish-brown tinged with green; iris brown; feet dull plumbeous. Total length 325 mm.; culmen 35, wing 147, tail 62, tarsus 30.

Immature male. Is similar in many respects to the adult female but more boldly marked and may be distinguished by the indication of barring on the abdomen, the pale grey of the upper wing-coverts and the wing speculum.

Another specimen in similar plumage, to the one cited above, shows an approach of dark feathers on the chin.

THE BIRDS OF AUSTRALIA.

A third specimen which is much more advanced towards the adult plumage but lacks the chocolate-brown of the face, throat and fore-neck, these parts being white streaked with brown: the brown and buff markings on the chest are more irregular and squamate in form.

Nest. A depression in the ground.

Eggs. Clutch, ten to twelve; ground-colour buffish; axis 45 mm.; diameter 30.

THIS species was added to the Australian List by Campbell on account of two specimens shot by Mr. Wm. Shaw at Lake Connemara, Victoria, in March or April, 1896. No evidence can be found that would lead to the fact that these were escaped captive birds, though of course this is strongly suggested.

In the meanwhile, until other specimens are procured, this species should be placed on a Hypothetical List. I do not therefore recognise it fully as an Australian bird and have not given a plate but have given a full description so that it would easily be recognised if again met with.

The birds described were collected in India in 1898-9.

GENUS—SPATULA.

SPATULA Boie, Isis 1822, p. 564 Type *S. clypeata*.

Rhynchaspis Stephens in Shaw's Gen. Zool., Vol. XII.,

pt. II., p. 114, 1824 Type *S. clypeata*.

Also spelt—

Rhinaspis Bonaparte, Isis 1832, p. 1186.

Rynchaspis Brehm, Vogelfang, p. 377, 1855.

Rhynchasmus Koenig, Journ. fur. Orn., 1893, p. 104.

Spathulea Fleming, Hist. Brit. Animals, p. 123, 1828 Type *S. clypeata*.

Also spelt—

Spatulea Salvadori, Cat. Birds Brit. Mus., Vol. XXVII., p. 306, 1895.

Clypeata Lesson, Manuel d'Orn., Vol. II., p. 416,

1828 Type *S. clypeata*.

Souchets "Cuv. 1817" Gray, Handl. Gen. Sp. Birds,

pt. III., p. 84, 1871. Type *S. clypeata*.

ANATINE birds of medium size with characteristic very long broad bill, much broader than deep: otherwise structurally the species of this genus closely resemble those of *Anas*. The bill is very long, much longer than the head and about twice the length of the metatarsus; the bill is high and narrow at its base, the upper mandible spreading out into a broad flattened apical portion, with small well-defined overhanging tip: the culmen ridge fairly well marked, the nostrils situated high up, near base of bill close together on either side of the culmen ridge. The sides of the mandible are for half-way deeply cut into, showing a well-developed long comb which is still present though overhung by expansion of the sides on the anterior portion. The lower mandible is narrow at the base and broader anteriorly to correspond with expansion present in upper mandible; the rami are almost parallel enclosing bare space, and reaching almost to the end, leaving a very small flattened nail which fits into the nail of the upper mandible. The depth of bill at the base is about one-third its length, while its breadth is only about a quarter: at two-thirds the length from the base the bill is broadest and is then almost half its length.

The wing is long with first primary longest.

The tail is comparatively long with pointed feathers, about one-third the length of the wing, and longer than the bill.

The metatarsus is about half the length of the culmen and is scutellated anteriorly on frontal face, but otherwise reticulate.

The toes are long and fully webbed, the middle toe being longer than the metatarsus; the hind toe is rather long and narrowly lobed.

SPATULA CLYPEATA INDIANA.

EASTERN SHOVELER.

SPATULA CLYPEATA INDIANA Mathews, Austral Av. Rec., Vol. I., p. 194, 1913; India.

Spatula clypeata (not Linné) Gould, Handb. Birds Austr., Vol. II., p. 370, 1865; Ramsay, Proc. Linn. Soc. N.S.W., Vol. II., p. 200, 1878; *id.*, Tab. List. Austr. Birds, p. 22, 1888; Hall, Key Birds Austr., p. 107, 1899; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 1043, 1901; Hall, Key Birds Austr., 2nd ed., p. 107, 1906; Mathews, Handl. Birds Austral., p. 36, 1908; *id.*, Nov. Zool., Vol. XVIII., p. 238, 1912.

Spatula clypeata indiana Mathews, List Birds Austr., p. 92, 1913.

DISTRIBUTION. India; East Asia southward to the Malay Archipelago; (??) accidental in Australia.

Adult male. Head and neck glossy green with bluish reflections, becoming brown near the base of the bill and black on the centre of the throat and middle of the crown; fore-neck, sides of neck, and short scapulars white; a narrow line of brown feathers down the hind-neck which joins with the mantle and upper back, becoming darker on the lower back, rump, and upper tail-coverts, all of which are more or less glossed with green; lesser upper wing-coverts and outer scapulars blue-grey; greater coverts dark brown broadly tipped with white, more narrowly on the inner ones; bastard-wing, primary-coverts and quills pale brown darker towards the tips of the latter and with white shafts; outer webs of outer secondaries dark metallic-green, which forms a wing speculum; innermost secondaries and some of the scapulars velvety black broadly centred with white; tail dark brown becoming paler on the outer feathers which are broadly margined with white; breast, sides of the body and abdomen chestnut, slightly barred with black; a white patch on each side of the rump; under tail-coverts greenish-black more or less mottled with white; axillaries and under wing-coverts white. Bill lead-colour; iris yellow; feet orange-red. Total length 500 mm.; culmen 66, wing 232, tail 67, tarsus 37.

Adult female. Distinguished from the adult male chiefly by the absence of the green on the head, the white on the fore-neck, the green wing speculum, the ornamental scapulars, and the chestnut on the under-surface.

Immature male. Similar to the female but much darker above with buff margins to the feathers, instead of white, a green wing speculum, and the under-surface more ochreous-buff.

Nest. A depression in the ground.

Eggs. Clutch, ten to twelve; ground-colour greenish; axis 52 mm.; diameter 38.

GOULD added this species to the Australian List with the following account:
“Although I have no Australian skin of this species to confirm the following

EASTERN SHOVELER.

remarks, I must ask my ornithological readers both in Australia and Europe to take my word for the occasional appearance of the bird in Australia. When I visited New South Wales during the rainy season of 1839, all the depressed parts of the land were filled with water, and the lagoons here, there, and everywhere were tenanted by hundreds of Ducks of various species, and every now and then one, two, or more beautifully plumaged Shovelers were seen among them; but I did not succeed in shooting one of them, and must have left the matter in doubt as to the particular species, if the late Mr. Coxen, of Yarrundi, had not had the skin of a splendid old male in his possession, which he had himself shot, and which, after a careful examination, I found to be identical with the *Spatula clypeata* of Britain and the European continent. Misfortune, I regret to say, attended Mr. Coxen's specimen, for a day or two afterwards a rat or some other kind of vermin entered the room in which it was kept, ate off its bill and legs, and so otherwise mutilated the skin as to render it useless. The debris would still have been saved had I not hoped and felt assured of obtaining other examples with my gun: this hope, however, was never realised.

"To this subject, therefore, I recommend the attention of those in Australia, who will doubtless meet with the bird some day when the country is subject to a partial inundation. That this species should extend its wanderings to Australia is not a matter of surprise, when we know that it has been found within the Tropics both in the Old and New Worlds."

Campbell, sixty years after the date of the first occurrence, knew of no further record, but notes that a correspondent wrote him regarding a strange bird shot at Jandilla, Queensland, some years previously, which he concluded might have been a European Shoveler.

Until fresh evidence is forthcoming this bird cannot be admitted to the Australian List, though it is quite probable that careful watching might reveal a rare straggler; I have therefore given detailed description whereby such could be recognised.

The male bird described was collected in Assam, on the 2nd of April, 1905.

SPATULA RHYNCHOTIS RHYNCHOTIS.

AUSTRALIAN SHOVELER.

(PLATE 213.)

- ANAS RHYNCHOTIS Latham, Index Ornith. Suppl., p. lxx., 1801; New South Wales.
 New Holland Shoveler Latham, Gen. Synops. Birds, Suppl., II., p. 359, 1801; *id.*, Gen. Hist. Birds, Vol. X., p. 313, 1824.
- Anas rhynchotis* Latham, Index Ornith. Suppl., p. lxx., 1801; Lesson, Traité d'Orn., p. 633, 1831; Schlegel, Mus. Pays-Bas, Vol. VI., Anseres, p. 35, 1866.
- Rhynchaspis rhynchotis* Stephens in Shaw's Gen. Zool., Vol. XII., pt. II., p. 123, 1824; Eyton, Monogr. Anat., p. 133, 1838; *id.*, Proc. Zool. Soc. (Lond.), 1839, p. 114; Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 650, 1856.
- Rhynchaspis maculatus* (not Gould) Eyton, Monogr. Anat., p. 134, 1838.
- Spatula rhynchotis* Gray, Annals Mag. Nat. Hist., Vol. XI., p. 194, 1843; *id.*, List Birds Brit. Mus., pt. III., p. 140, 1844; *id.*, Genera Birds, Vol. III., p. 618, 1845; Gould, Birds Austr., Vol. VII., pl. 12, 1845; Reichenbach, Synops. Av. Natat., pl. 110, fig. 980, 1845; pl. 86, figs. 2334-5, 1850; Stokes Discov. in Austr., Vol. I., App., p. 483, 1846; Sturt, Narr. Exped. Centr. Austr., Vol. II., App., p. 56, 1849; Gould, Proc. Zool. Soc. (Lond.), 1856, p. 95; *id.*, Handb. Birds Austr., Vol. II., p. 368, 1865; Pelzeln, Reise Novara Vögel., p. 139, 1865; Gray, Handl. Gen. Sp. Birds, pt. III., p. 85, 1871; Diggles, Birds Austr., Vol. II., pl. 112, 1877; Ramsay, Proc. Linn. Soc. N.S.W., Vol. II., p. 200, 1877; Sclater, Proc. Zool. Soc. (Lond.), 1880, p. 523; Baird, Brewer and Ridgway, Water Birds North Amer., Vol. I., p. 525, 1884; Legge, Papers and Proc. Roy. Soc. Tasm., 1886, p. 244, 1887; *id.*, *ib.*, 1887, p. 97, 1888; Ramsay, Tab. List Austr. Birds, p. 22, 1888; North, Austr. Mus. Cat., no. 12, p. 343, 1890; Heine and Reichenow, Nomencl. Mus. Hein., p. 347, 1890; Hartert, Katal. Vögels Mus. Senckenb., p. 232, 1891; Salvadori, Cat. Birds Brit. Mus., Vol. XXVII., p. 314, 1895; Hall, Key Birds Austr., p. 108, 1899; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 1044, 1901; Carter, Emu, Vol. III., p. 212, 1904; Legge, Emu, Vol. IV., p. 108, 1905; Hall, Key Birds Austr., 2nd ed., p. 108, 1906; Berney, Emu, Vol. VI., p. 157, 1907; Batey, *ib.*, Vol. VII., p. 14, 1907; Austin, *ib.*, p. 79, 1907; Mathews, Handl. Birds Austral., p. 36, 1908; Hall, Emu, Vol. IX., p. 77, 1909; *id.*, *ib.*, p. 133, 1910; Broadbent, *ib.*, Vol. X., p. 245, 1910; Littler, Handb. Birds Tasm., p. 223, 1910; Stone, Emu, Vol. XII., p. 121, 1912; White, *ib.*, p. 183, 1913; *id.*, *ib.*, Vol. XIII., p. 23, 1913; North, Austr. Mus. Spec. Catal., no. 1, Vol. IV., p. 82, 1913; White, Emu, Vol. XIII., p. 124, 1914; Barnard, *ib.*, Vol. XIV., p. 41, 1914.



H. Grönvold, del.

Witherby & Co

$\frac{1}{3}$

SPATULA RHYNCHOTIS.
(AUSTRALIAN SHOVELER).

AUSTRALIAN SHOVELER.

? *Spatula variegata* North, Rec. Austr. Mus., Vol. II., p. 37, 1892; Hall, Key Birds Austr., p. 108, 1899.

Spatula rhynchotis rhynchotis Mathews, Nov. Zool., Vol. XVIII., p. 238, 1912; *id.*, List Birds Austr., p. 92, 1913.

DISTRIBUTION. Queensland; New South Wales; Victoria; Tasmania; South Australia; South-west Australia.

Adult male. Hinder face, sides of nape, and sides of the neck glossy greyish-green; chin, fore-head, lores, and crown of head dark brown with chestnut margins to the feathers; a vertical line of white on the fore-part of the cheeks; back dark brown with pale edges to the feathers, some of the scapulars barred and lined with white; lesser wing-coverts blue-grey like the outer webs of some of the long scapulars; median-coverts brown broadly tipped with white which forms a wing-bar; bastard-wing, primary-coverts and quills dark brown, the latter with white shafts; outer webs of the outer secondaries dark metallic-green with black tips which incloses a wing speculum, the long innermost secondaries glossy greenish-brown with pale shaft lines; lower back, rump, and upper tail-coverts black glossed with green; tail dark brown, the outer feathers paler and margined with white; sides of rump white barred and vermiculated with green; entire under-surface dark chestnut barred with black; under tail-coverts black glossed with green; axillaries and under wing-coverts white; iris bright yellow; feet bright orange, bill black. Total length 540 mm.; culmen 60, wing 250, tail 83, tarsus 37.

Adult female. Distinguished by the speckled appearance on the sides of the face, throat, and fore-neck, and by the absence of the dark chestnut on the under-surface; iris greenish-brown; feet yellow; bill yellowish-green, with black spots.

Nest. A slight hollow, lined with down and placed on the ground.

Eggs. Clutch, four to seven; ground-colour creamy-white, slightly glossy; axis 49-53 mm.; diameter 37-38.

Breeding-season. "August to November" (Campbell).

THOUGH this bird was described by Latham, little of its life-history is yet known.

Captain S. A. White states: "The 'Shovellers' were found in every part of the lake (Alexandrina) and passage; they seem to dive a lot for their food. Strange to say, 70 to 80 per cent. of these birds are males: they make a very loud and startling noise when they take to the wing, which can be heard a long way off. Their flesh is not equal to either Black Duck or Teal. I have proved them to have an extraordinary sense of smell. These birds are fairly plentiful at times, and in 1889 they visited the Reed-beds in great numbers, and in October nested amongst the high clover in my paddocks. The nests were rudely formed on the ground and the eggs varied from four to seven in a nest."

Mr. J. W. Mellor has written me: "Commonly known as the 'Shoveller,' also as the 'Blue Wing.' They are not plentiful, but at times are seen in fair numbers in the swampy localities. I have taken them at the Reed-beds, South Australia, and also seen them on Lakes Alexandrina and Albert. They have a very fast flight, and one generally knows when 'Shovellers'

THE BIRDS OF AUSTRALIA.

enter the pool at night, when waiting for a shot at ducks, by the straight swoop and arrow-like rapidity with which they settle on the surface of the water. They choose a secluded spot for their nest among the thick grass and bushes adjacent to the swamps. Their food is obtained chiefly about the water and consists of seeds and aquatic growth found in these localities, the water being sifted through their shovel-like bills, and anything desirable retained and eaten. They are often sent into the Adelaide market for eating purposes."

Mr. Tom Carter's notes are: "The Shoveller is a rare species. The only specimen noted by me in the Mid-west I shot sixty miles inland from Point Cloates, Oct. 30, 1900. One was shot the same year on the Minilya River. I was *told* of one being shot at Lake Muir."

Berney (*Emu*, Vol. VI., p. 157, 1907) records: "Very seldom seen in the Richmond district (S. Queensland); there were a few about in January 1900, and I saw a single bird in January 1902."

Hall, writing about the birds of the Murray River district (*Emu*, Vol. IX., p. 77, 1909) writes: "This is the most local of the Ducks, and may be found when nearly all the other species have gone north or have distributed themselves. Their young are later abroad. To a limited extent only they nest in this district. When feeding one may distinctly hear them sieving in the mud. As with every other animal, they place their confidence in man until once shot at with a heavy gun. It is then difficult to approach near to a flock. It is a very quick flier. A flock will be asleep, and, if alarmed, the whole body will be 20 feet high in the air in the next instant. One 'Bluewing' will make as much noise as a whole flock of any other Duck. There is a hum in the wing as it rises. The males have a form of play by rising 15 to 20 feet directly above where they were swimming and very quickly. They immediately fall back to their swimming position."

Stone, on the Birds of Lake Boga, Victoria (*Emu*, Vol. XII., p. 121, 1912) says: "Very common. I think these Ducks are the most suspicious of the presence of possible danger. Maximum, twelve eggs."

North recorded a specimen of the New Zealand Shoveler as having been procured in Australia, but as I consider the New Zealand bird only subspecifically distinct, I conclude that North's specimen was simply an aberration of the Australian form and do not include the New Zealand bird in the Australian List.

Of the birds figured and described, the male was collected at Narandra, New South Wales, in May, 1892, and the female at Lake Alexandra, South Australia, on the 26th February, 1912, by Capt. S. A. White.

GENUS—MALACORHYNCHUS.

MALACORHYNCHUS Swainson, Journ. Roy. Inst.

Great Brit., Vol. II., pt. iv., p. 18, 1831 .. Type *M. membranaceus*.

Also spelt—

Malacorynchus Swainson, Classif. Birds, Vol. II., p. 366, 1837.

Malacorhynchos Bonaparte, Ann. Sci. Nat. Paris, Ser. IV., Vol. I., p. 151, 1854.

SMALL Anatine birds with very long spatulate bills, with lateral leathery appendages.

The bill is very long, much longer than the head, and more than one-third the length of the wing, rather shallow at the base, not expanding much anteriorly but developing laterally long wing-like leathery appendages; its depth is little more than one-quarter of its length and is equal to its breadth. Long finely-toothed combs are strongly developed along the inner edges of the upper mandible right up to the nail, which is well defined as a small overhanging triangular tip. The combs are externally observable, save where obscured by the lateral wings. The nostrils are small ovals placed high up near the base and approximate very closely; the culmen ridge is scarcely marked except between nostrils, anteriorly merging into lateral edges; the lateral edges are straight, and do not show a bag as in the previous genus.

The under mandible is very narrow: the rami are well marked enclosing an unfeathered tract, and extending almost the whole length of the mandible, only a very small nail, agreeing with that of the upper, occurring. On each side of the rami a soft leathery expansion can be observed, and strong combs similar to those of the upper mandible are present. The wings are long, the first primary being longest. The tail is short, less than one-third the length of the wing. The metatarsus is little more than half the length of the culmen, and is exceeded slightly by the middle toe. The toes are fully webbed, the hind-toe narrowly lobed.

MALACORHYNCHUS MEMBRANACEUS.

PINK-EARED DUCK.

(PLATE 214.)*

ANAS MEMBRANACEA Latham, Index Ornith. Suppl., p. lxi., 1801; New South Wales.

New Holland D(uck) Latham, Gen. Synops. Birds, Suppl., Vol. II., p. 359, 1801.

Anas membranacea Latham, Index Ornith. Suppl., p. lxi., 1801; Vieillot, Nouv. Dict. d'Hist. Nat., Vol. V., p. 108, 1816; Dumont, Dict. Sci. Nat. (Levrault), Vol. VI., p. 388, 1817; Vieillot, Tabl. Ency. Meth. Ornith., Vol. I., p. 358, 1820.

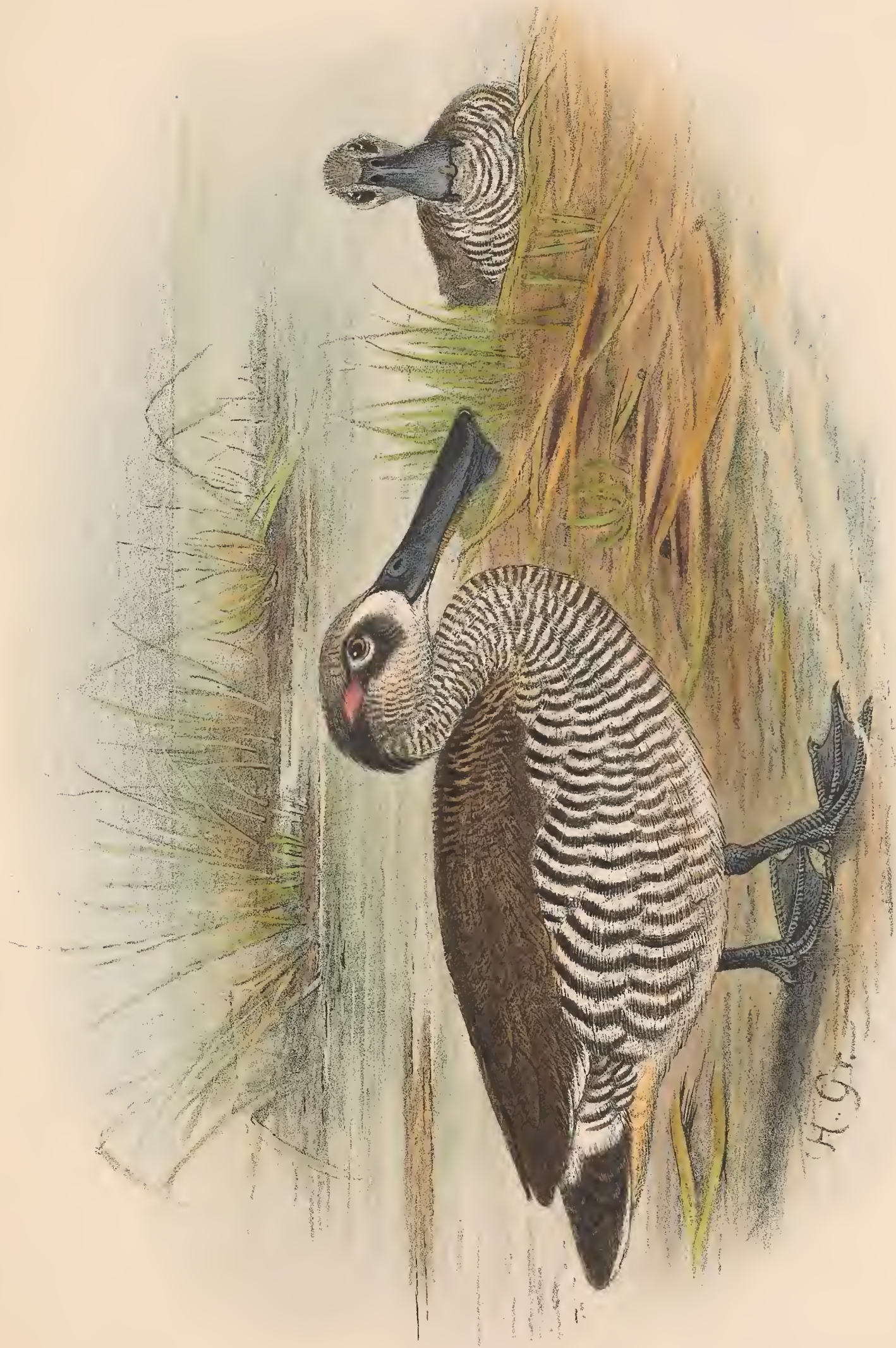
Anas fasciata Shaw, Nat. Miscellany, Vol. XVII., pl. 697, 1805; New South Wales; Lesson, Traité d'Orn., p. 632, 1831.

Membranaceous Duck, Latham, Gen. Hist. Birds, Vol. X., p. 331, 1824.

Rhynchaspis membranacea Stephen's in Shaw's Gen. Zool., Vol. XII., pt. II., p. 124, 1824.

Malacorhynchus membranaceus Swainson, Journ. Roy. Soc. Great Brit., Vol. II., pt. IV., p. 18, 1831; Gray, List Genera Birds, p. 74, 1840; *id.*, *ib.*, 2nd ed., p. 94, 1841; *id.*, List Birds Brit. Mus., pt. III., p. 139, 1844; *id.*, Genera Birds, Vol. III., p. 618, 1845; Hartlaub, Syst. Verz. Ges. Mus., p. 120, 1844; Gould, Birds Austr., Vol. VII., pl. 13, 1845; Leichhardt, Journ. Overl. Exped. Austr., pp. 282, 319, 333, 341, 1847; Stokes Discov. in Austr., Vol. I., App., p. 483, 1846; Reichenbach, Synops. Av. Natat., pl. 88, figs. 924-925, 1845; pl. 86, figs. 2332-3, 1850; Gray, Genera Birds, App., p. 28, 1849; Sturt, Narr. Exped. Centr. Austr., Vol. II., App., p. 56, 1849; Reichenbach, Nat. Syst. Vögel, p. ix., 1852; Lichtenstein, Nomencl. Av. Mus. Zool. Berol., p. 102, 1854; Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 650, 1856; Züchold, Journ. für Orn., 1858, p. 41; Gould, Handb. Birds Austr., Vol. II., p. 372, 1865; Ramsay, Ibis 1866, p. 335; Müller, Proc. Zool. Soc. (Lond.) 1869, p. 280; Gray, Handl. Gen. Sp. Birds, pt. III., p. 85, 1871; Sundevall, Meth. Nat. Av. Disp. Tent., p. 148, 1872; Ramsay, Proc. Linn. Soc. N.S.W., Vol. I., pp. 195, 216, 219, 1877; Castelnau and Ramsay, *ib.*, p. 386, 1877; Ramsay, *ib.*, Vol. II., p. 200, 1877; Diggles, Birds Austr., Vol. II., pl. 113, 1877; Selater, Proc. Zool. Soc. (Lond.) 1880, p. 524; Ramsay, Proc. Linn. Soc. N.S.W., Vol. VII., p. 58, 1882; Baird, Brewer and Ridgway, Water Birds, Vol. I., p. 525, 1884; Legge, Papers and Proc. Roy. Soc. Tasm. 1886, p. 244, 1887; North, Austr. Mus. Cat., no. 12, p. 344, 1890; Heine and Reichenow, Nomencl. Mus. Hein., p. 347, 1890; Salvadori, Cat. Birds Brit. Mus., Vol. XXVII., p. 319, 1895; North, Trans. Roy. Soc. South Austr., Vol. XXII., p. 191, 1898; Hall, Key

* The Plate is lettered *Malacorhynchus assimilis*.



H. Grönvold, del.

Witherby & Co

$\frac{1}{2}$

MALACORHYNCHUS ASSIMILIS.
(WESTERN PINK-EARED DUCK).

PINK-EARED DUCK.

Birds Austr., p. 108, 1899; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 1046, 1901; Lyons, Emu, Vol. I., p. 136, 1902; Carter, *ib.*, Vol. III., p. 212, 1904; Hall, Key Birds Austr., 2nd ed., p. 108, 1906; Berney, Emu, Vol. VI., p. 157, 1907; Batey, *ib.*, Vol. VII., p. 14, 1907; Austin, *ib.*, p. 79, 1907; Ingram, Ibis 1907, p. 395; Mathews, Handl. Birds Austral., p. 36, 1908; Hall, Emu, Vol. IX., p. 79, 1909; Sassi, Journ. für Orn., 1909, p. 383; Littler, Handb. Birds Tasm., p. 225, 1910; Stone, Emu, Vol. XII., p. 121, 1912; Mathews, Nov. Zool., Vol. XVIII., p. 239, 1912; *id.*, List Birds Austr., p. 92, 1913; North, Austr. Mus. Spec. Cat., no. 1, Vol. IV., p. 84, 1913; Macgillivray, Emu, Vol. XIII., p. 147, 1914.

Malacorhynchus fasciatus Wagler, Isis 1832, p. 1235.

Malacorhynchus membranaceus Swainson, Classif. Birds, Vol. II., p. 366, 1837.

Malacorhynchus membrinacea Eyton, Monogr. Anat., p. 136, 1838.

Malacorhynchus iodotis Lesson, Echo du Monde Savant, 11th year, no. 6, col. 128, July 21, 1844 (see reprint, p. 151), New South Wales; *id.*, Descr. Mamm. Ois., p. 246, 1847.

Anas iodotis Schlegel, Mus. Pays-Bas, Vol. VI., Anseres, p. 36, 1866.

Anas malacorhyncha (nec Gmelin) *id.*, *ib.*

Malacorhynchus malacorhynchus (nec Gmelin) Hartert, Katal. Vögels Mus. Senckenb., p. 232, 1891.

Malacorhynchus membranaceus assimilis Mathews, Austral Av. Rec., Vol. I., p. 86, 1912; Fitzroy River, N.W.A.

Malacorhynchus membranaceus membranaceus Mathews, *ib.*

DISTRIBUTION. Australia; Tasmania.

Adult male. Crown of head and fore-head hoary grey; a patch of dark brown in front of the eye and which encircles the latter extending also along the sides of the crown on to the nape and hind-neck; a pink spot on each side of the head behind the eye; throat, lores, a narrow eyebrow, and a narrow ring round the eye white; sides of face, sides of neck, and entire under-surface including the under wing-coverts white barred with brown, more broadly on the breast and sides of the body and more narrowly on the abdomen and sides of the face; axillaries and under tail-coverts pure white; upper back, scapulars and wings earth-brown barred with buff on the mantle and minutely vermiculated with buff on the scapulars and upper wing-coverts; bastard-wing dark brown edged with white; primary-coverts and quills dark brown; inner primary- and secondary-quills tipped with white; sides of the rump white barred with brown; rump and upper tail-coverts dark brown, the latter broadly tipped with white; tail-feathers brown fringed with white at the tips. Bill and feet slaty-blue; eyes brown. Total length 420 mm.; culmen 62, wing 181, tail 63, tarsus 35.

Adult female. Distinguished from the adult male only by its smaller size. Culmen 57 mm., wing 177, tail 61, tarsus 31.

Nest. A deserted nest of a Heron (or a nest made as a platform), with down built up to form an egg cavity sometimes four inches high, which, being elastic, covers over the eggs more or less when the bird leaves the nest.

Eggs. Clutch, six to eight; kite shaped; ground-colour creamy-white, surface dull; axis 45-46 mm.; diameter 32.

Breeding-season. August to December.

THE BIRDS OF AUSTRALIA.

THIS is another bird described by Latham in 1801, but it appears to have attracted notice earlier than that, as a reference to the "Whistling Duck" was made when Latham described the Semipalmated Goose in 1798 as noted under that species. The name "Whistling Duck" has since been generally applied to Tree Ducks, so that it is necessary to bear this in mind when reading ancient records.

Sturt makes the note: "It is very common on most of the Australian creeks and streams, and is called the 'Whistling Duck,' which gave the clue to Latham's expression.

Very little is known of its habits, as might be expected on account of its frequency everywhere. Field Naturalists please note. I write this as it will be observed as little is known of the life-history of Common species of Ducks as of rare species.

Captain S. A. White has written me: "This pretty little duck is never seen in any numbers near the coast, but in the interior they congregate during good seasons and lay in numbers and bring up their young. . . . The 'pink-eared Duck' was very scarce on the lakes during our visit, due no doubt to their having followed the heavy rains into the interior to nest some months previous to our visit."

Mr. Tom Carter's only note reads: "Not uncommon in the Mid-west: mostly seen on shallow clay pans."

Hall remarks (*Emu*, Vol. IX., p. 79, 1909): "This bird feeds in the same manner as the Shoveler. It shovels about in the mud, head down and tail up, as it floats. The preference is for brackish lagoons."

The most interesting note I have seen is that by Berney (*Emu*, Vol. VI., p. 157, 1907): "The quaint little Pink-ear is one of the more uncommon Ducks with us, not too often seen, and then as a rule in small numbers; its irregular visits are confined to the wet season. While at a waterhole on one occasion a mob of five-and-twenty of these birds (the most I think I ever saw together) in company with a dozen Teal, swept over my head and dropped on to the water 30 yards further down. They appeared little disturbed by my presence, so I determined, as I could touch bottom with my feet, to cultivate a closer acquaintance. With only my nostrils and the top of my head above water I approached them steadily. Allowing me to get right amongst them, they evinced considerable interest in my proceedings, with but little or no fear; they chased one another about, they courted or preened their feathers, within a few feet of my head, now and again one standing up to flap its wings in my face. All the time the mob kept up a subdued running conversation in their soft musical notes. At times I could almost have caught some of

PINK-EARED DUCK.

the birds by their feet and drawn them under, blackfellow fashion—I could certainly have done it had I had a covering of bushes or rushes for my head. This refers to the Pink-ears; the Teal of the party more discreetly watched the development of proceedings from the outside of the mob. They are very confiding little Duck, and easily shot, but are not much sought after by shooters, as they are so small, only going from half to three-quarters of a pound, and are reckoned dry and poor eating. Mr. A. S. Le Souëf, who examined the stomach of (a female) specimen, reported that it contained vegetable matter and fresh-water shells.”

The bird figured and described was collected on the Fitzroy River, North-west Australia, on the 10th of January, 1896.

GENUS—STICTONETTA.

STICTONETTA Reichenbach, Nat. Syst. Vogel., p. ix.,
1852 Type *S. naevosa*.

MEDIUM-SIZED Anatine birds characterised by the "freckled" coloration.

The bill is long, longer than the head, rather high at base, suddenly descending and anteriorly rather concave where there is also a slight lateral expansion; nail very small, well defined with rather triangular tip: the lateral edges are straight and though internally there are well developed and separated lamellæ, these are not externally visible. The under mandible is narrow throughout its length, no corresponding expansion to that of the upper mandible taking place; the interramal space is narrow and unfeathered and the nail is long. The neck is rather long. The wings are comparatively short with the first primary longest. The tail is short, composed of square broad feathers almost obscured by the upper tail-coverts. The tail is little longer than the bill and not much more than a quarter of the wing length.

The legs are long and very stout, while the toes are about equal in length and also stout: they are fully webbed, and the hind toe is narrowly lobed and comparatively long.

Salvadori (*Catalogue of the Birds in the British Museum*, Vol. XXVII., p. 324, 1895) has commented: "Systematic position very uncertain," and gives details somewhat as above.



H. Grönvold. del.

Witherby & Co.

$\frac{1}{2}$

STICTONETTA BRANDA.
(EASTERN FRECKLED DUCK).

STICTONETTA NÆVOSA.

FRECKLED DUCK.

(PLATE 215.)*

ANAS NÆVOSA Gould, Proc. Zool. Soc. (Lond.), 1840, p. 177, 1841; West Australia.*Anas nævosa* Gould, Proc. Zool. Soc. (Lond.), 1840, p. 177; *id.*, Birds Austr., Vol. VII., pl. 10, 1841; Selater, Proc. Zool. Soc. (Lond.) 1864, p. 192; Schlegel, Mus. Pays-Bas, Vol. VI., Anseres, p. 63, 1866; Müller, Proc. Zool. Soc. (Lond.) 1869, p. 280; Ramsay, Proc. Linn. Soc. N.S.W., Vol. I., pp. 195, 216, 219, 1877; Morton, Papers and Proc. Roy. Soc. Tasm. 1884, p. lxix., 1885.*Tadorna nævosa* Gray, List Birds Brit. Mus., pt. III., p. 132, 1844; *id.*, Genera Birds, Vol. III., p. 613, 1845; Reichenbach, Synops. Av. Natat., pl. 93, fig. 431, 1845; Gray, Handl. Gen. Sp. Birds, pt. III., p. 80, 1871.*Stictonetta nævosa* Reichenbach, Nat. Syst. Vogel., p. ix., 1852; Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 649, 1856; Gould, Handb. Birds Austr., Vol. II., p. 367, 1865; Ramsay, Proc. Linn. Soc. N.S.W., Vol. II., p. 200, 1878; *id.*, *ib.*, Vol. III., p. 154, 1878; Legge, Papers and Proc. Roy. Soc. Tasmania, 1886, p. 244, 1887; Ramsay, Tab. List Austr. Birds, p. 22, 1888; North, Austr. Mus. Cat., no. 12, p. 340, 1890; Hartert, Katal. Vogels Mus. Senckenb., p. 228, 1891; Harting, Ibis 1894, p. 297; Salvadori, Cat. Birds Brit. Mus., Vol. XXVII., p. 324, 1895; Hall, Key Birds Austr., p. 108, 1899; Campbell, Ibis 1899, p. 362, fig.; *id.*, Nests and Eggs Austr. Birds, Vol. II., p. 1049, 1901; Carter, Emu, Vol. III., p. 212, 1904; Legge, *ib.*, Vol. IV., p. 108, 1905; Hartert, Nov. Zool., Vol. XII., p. 206, 1905; M'Clymont, Emu, Vol. V., p. 162, 1906; Hall, Key Birds Austr., 2nd ed., p. 108, 1906; Mathews, Handl. Birds Austral., p. 36, 1908; Hall, Emu, Vol. IX., p. 79, 1909; *id.*, *ib.*, p. 133, 1910; Littler, Handb. Birds Tasm., p. 225, 1910; Ogilvie-Grant, Ibis 1910, p. 173; Mathews, Nov. Zool., Vol. XVIII., p. 239, 1912; Stone, Emu, Vol. XII., p. 121, 1912; Orton and Sandland, *ib.*, XIII., p. 76, 1913; North, Austr. Mus. Spec. Cat., no. 1, Vol. IV., p. 88, 1913; Mathews, List Birds Austr., p. 93, 1913.*Stictonetta nævosa lesueurii* Mathews, Austral Av. Rec., Vol. I., p. 87, 1912; New South Wales.*Stictonetta nævosa nævosa* Mathews, *ib.*

DISTRIBUTION. Australia; Tasmania.

Adult male. Entire upper-surface, throat and fore-neck dark brown inclining to black on the head, barred and vermiculated with white or buffy-white, becoming much paler on the abdomen and under tail-coverts; axillaries and under wing-coverts white; quills dark brown, paler on the inner webs. Bill greenish-grey, darker at* The Plate is lettered *Stictonetta branda*.

THE BIRDS OF AUSTRALIA.

the tip; iris light brown; feet bluish-green. Total length 515 mm.; culmen 55, wing 230, tail 68, tarsus 43.

In full breeding plumage this bird has the feathers of the back of the head elongated and the base of the bill gets red at this season.

Adult female. Similar to the adult male but smaller and not so dark on the head and fore-neck. Total length 510 mm.; culmen 49, tail 64.

Nest. "Similarly situated to those of most Ducks, in herbage upon the ground" (Campbell).

Eggs. "Clutch, ten to twelve probably; long ellipse in form; texture of shell comparatively fine; surface glossy or greasy to the touch; colour light greenish-white. Most resemble those of the Black Duck. Dimensions in inches: $2.26-2.5 \times 1.65-1.7$ " (Campbell).

Breeding-season. Not recorded.

FIRST described by Gould in 1840, still very little is known regarding the life-history or structure of this bird.

Captain S. A. White has written me: "I have only seen this fine duck down South during droughts in the interior. They are very fast fliers, and when duck-shooting by moonlight I have known these birds to strike the water with such force that they have been momentarily stunned. I have never known them to breed. Saw a few on a lagoon on Eyre's Peninsula in 1909."

Mr. J. W. Mellor confirms the preceding in his note: "Called the 'speckled' duck, also 'freckled' duck. These birds are found in South Australia, but are not constant with us in the southern coastal districts, but visit us at times in the winter months. I have seen them at the Reed-beds, near Adelaide, also on the lower reaches of the River Murray; it is a somewhat shy bird, and not easily stalked. On the expedition to Eyre's Peninsula in 1909 I saw some of these ducks at Warenda, right in the scrub country, where they were about a small waterhole in an almost dry creek. A specimen was obtained, which is in my collection. The sexes are alike in coloration. A peculiarity about these ducks is the very narrow bill in comparison to that of the other members of the duck family, but this is compensated for by the extra depth especially at the base and nostrils. Occasionally these ducks are sent into the Adelaide market for food."

Mr. Tom Carter states: "This is a rare species and has only once come under my notice, viz. July 23, 1900, when I shot three from a small flock at a pool inland from Point Cloates."

Hall (*Emu*, Vol. IX., p. 79, 1909) notes: "Here we have a Duck quiet, lame and sleepy. Shooters say it has no sense of smell. Its voice is likened to the grunt of a Berkshire pig."

The bird figured and described was collected in New South Wales.

GENUS—NYROCA.

NYROCA Fleming, Philos. Zool., Vol. II., p. 260, 1822 .. Type *N. nyroca*.

Aythya Boie, Isis 1822, p. 564 Type *N. nyroca*.

Also spelt—

Aithya Gloger, in Froriep's Notizen, Vol. XVI., p. 279, 1827.

Aethya, *id.*, *ib.*

Aithya Kaup, Skizz Entwick Gesch. Nat. Syst., p. 99, 1829.

Aithya Brandt, in Lehmann Reise nach Buchara, p. 329, 1852.

Aythya Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 651, 1856.

Aythia Salvadori, Cat. Birds Brit. Mus., Vol. XXVII., p. 334, 1895.

Ilyonetta Heine, Nomencl. Mus. Hein. Orn., p. 347, 1890 .. Type *N. nyroca*.

ANATINE birds with comparatively short bills, long wings, short tail, short legs, long toes, *the hind toe widely lobed*.

The bill is comparatively short, though longer than the head, comparatively broad and deep. The culmen ridge is ill-defined, the nail being somewhat obsolete and a little overhanging. The depth at the base is rather more than half its length and is equal to its breadth. A coarse comb can be observed on the internal edges of the upper mandible with a corresponding coarse serration present on the edges of the under mandible. The rami enclose a triangular unfeathered tract, the nail being not well marked off. The neck is short.

The wings are long, the first primary longest and narrow, showing flight capability.

The tail is short and square, about one-fourth the length of the wing, the feathers pointed to some extent.

The legs are short and stout, the metatarsus showing the usual solitary row of scutes on the anterior portion; in length it is just exceeded by the chord of the culmen.

The toes are long, the middle toe equalling the tail in length and much exceeding the metatarsus; the hind toe is long with a prominent broad lobe.

This is the sole Australian representative of the large section of Ducks, known as Diving Ducks from their manner of feeding.

It so closely resembles the northern species that I at one time only gave it subspecific rank; its northern origin is therefore obvious, as a close ally occurs in the East Indies.

Yet in New Zealand a "Diving Duck" lives which is in no way related to the Australian species, but is referred to a different genus, and that genus is unrepresented otherwise in the Southern Hemisphere. This constitutes another of the Austral-Neozelanic anomalies in this Order.

THE BIRDS OF AUSTRALIA.

In my *Hand-List* of the Birds of Australasia, following Sharpe's *Hand-List*, I made use of *Aythya* Boie, 1822. This was given priority over *Nyroca* Fleming, 1822, though both were published in the same year. I concluded *Nyroca* Fleming must be resumed (*Nov. Zool.*, Vol. XVII., p. 499, 1910), as Boie's name was shown to be preoccupied (Stone, *Auk* 1907, p. 190).

As regards priority Boie's name has undoubted claim, though Hartert (*Hand-List of British Birds*, by Hartert, Jourdain, Ticehurst and Witherby, 1910, p. 145, footnote) has argued otherwise. Given two dates, one certain and the other uncertain, *the certain date must always be accepted in preference to the later uncertain one.* Any other argument is invalid.



H. Grönvold, del.

Witherby & Co

$\frac{1}{5}$

NYROCA AUSTRALIS.
(AUSTRALIAN WHITE-EYED DUCK).

NYROCA AUSTRALIS.

WHITE-EYED DUCK.

(PLATE 216.)

NYROCA AUSTRALIS Eyton, Monogr. Anatidæ, p. 160, 1838 ; New South Wales.

Nyroca australis Eyton, Monogr. Anatidæ, p. 160, 1838 ; Gray, List Birds Brit. Mus., pt. III., p. 144, 1844 ; *id.*, Genera Birds, Vol. III., p. 621, 1845 ; Gould, Birds Austr., Vol. VII., pl. 16, 1847 ; Reichenbach, Synops. Av. Natat., pl. 79, figs. 2326-7, 1850 ; Lichtenstein, Nomencl. Av. Mus. Zool. Berol., p. 102, 1854 ; Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 651, 1856 ; Gould, Handb. Birds Austr., Vol. II., p. 377, 1865 ; Ramsay, Ibis 1867, p. 414 ; Müller, Proc. Zool. Soc. (Lond.) 1869, p. 280 ; Hutton, Trans. New Zeal. Inst. 1869, Vol. II., p. 78, 1870 ; Buller, Ibis 1870, p. 459 ; Hutton, *ib.*, p. 395 ; *id.*, Cat. Birds New Zeal., p. 38, 1871 ; Finsch, Journ. für Orn. 1872, p. 188 ; *id.*, *ib.*, 1874, p. 202 ; Buller, Hist. Birds New Zeal., p. 257, 1873 ; Sharpe, Voy. "Erebus" and "Terror" Birds, p. 31, 1875 ; Diggles, Birds Austr., Vol. II., pl. 116, 1877 ; Ramsay, Proc. Linn. Soc. N.S.W., Vol. I., pp. 195, 216, 219, 1877 ; *id.*, *ib.*, Vol. II., p. 200, 1878 ; *id.*, *ib.*, Vol. III., p. 154, 1878 ; *id.*, Proc. Zool. Soc. (Lond.) 1877, p. 347 ; Castelnau and Ramsay, Proc. Linn. Soc. N.S.W., Vol. I., p. 386, 1877 ; Buller, Manual Birds New Zeal., p. 72, 1882 ; *id.*, Hist. Birds New Zeal., 2nd ed., Vol. II., p. 275, 1888 ; Ramsay, Tab. List. Austr. Birds, p. 22, 1888 ; North, Austr. Mus. Cat., no. 12, p. 345, 1889 ; Buller, Trans. New Zeal. Inst. 1892, Vol. XXV., p. 63, 1893 ; Salvadori, Cat. Birds Brit. Mus., Vol. XXVII., p. 350, 1895 ; North, Trans. Roy. Soc. South Austr., Vol. XXII., p. 191, 1898 ; Hall, Key Birds Austr., p. 108, 1899 ; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 1050, 1901 ; Carter, Emu, Vol. III., p. 212, 1904 ; Hill, *ib.*, p. 229, 1904 ; Milligan, *ib.*, Vol. IV., p. 11, 1904 ; Legge, *ib.*, p. 108, 1905 ; Hartert, Nov. Zool., Vol. XII., p. 206, 1905 ; Hall, Key Birds Austr., 2nd ed., p. 108, 1906 ; Berney, Emu, Vol. VI., p. 157, 1907 ; Batey, *ib.*, Vol. VII., p. 14, 1907 ; Austin, *ib.*, p. 79, 1907 ; Broadbent, *ib.*, Vol. X., p. 245, 1910 ; Littler, Handb. Birds Tasm., p. 226, 1910 ; Stone, Emu, Vol. XII., p. 121, 1912 ; White, *ib.*, p. 183, 1913 ; Mathews and Iredale, Ibis 1913, p. 409 ; North, Austr. Mus. Spec. Cat., no. 1., Vol. IV., p. 90, 1913 ; Mathews, List Birds Austr., p. 93, 1913 ; White, Emu, Vol. XIII., p. 23, 1913 ; Orton and Sandland, Emu, Vol. XIII., p. 76, 1913 ; White, *ib.*, p. 124, 1914 ; Macgillivray, *ib.*, p. 147, 1914 ; Barnard, *ib.*, p. 209, 1914 ; *id.*, *ib.*, Vol. XIV., p. 41, 1914.

THE BIRDS OF AUSTRALIA.

- Fuligula australis* Schlegel, Mus. Pays-Bas, Vol. VI., Anseres, p. 30, 1866 ; Selater, Proc. Zool. Soc. (Lond.) 1880, p. 526 ; Legge, Papers and Proc. Roy. Soc. Tasm. 1886, p. 245, 1887 ; Hartert, Katal. Vögels Mus. Senckenb., p. 233, 1891.
- Aythya australis* Gray, Handl. Gen. Sp. Birds, pt. III., p. 87, 1871 ; Buller, Suppl. Birds New Zeal., Vol. II., p. 16, 1906 ; Mathews, Handl. Birds Austral., p. 36, 1908 ; Hall, Emu, Vol. IX., p. 78, 1909 ; Howe, *ib.*, p. 229, 1910 ; Mathews, *ib.*, Vol. X., p. 107, 1910.
- Anas australis* Giebel, Thes. Ornith., Vol. I., p. 345, 1892.
- Ilyonetta australis* Heine and Reichenow, Nomencl. Mus. Hein. Orn., p. 347, 1890.
- Fuligula baeri* (not Radde) Rothschild and Hartert, Nov. Zool., Vol. I., p. 684, 1894 (Waigou).
- Aethya australis* Ingram, Ibis 1907, p. 395.
- Nyroca nyroca australis* Mathews, Nov. Zool., Vol. XVIII., p. 239, 1912.
- Nyroca nyroca dampieri* Mathews, Austral Av. Rec., Vol. I., p. 87, 1912 ; Fitzroy River, North-west Australia.

DISTRIBUTION. Australia ; Tasmania (extra-limital).

Adult male. Entire upper-surface including the head, neck, throat, chest, and sides of body chestnut-brown, somewhat darker on the hind-neck ; lower abdomen similar but not so bright ; a pale crescent-shaped spot below the eye ; middle of abdomen whitish ; axillaries and under wing-coverts white, marginal under wing-coverts greyish-brown, outer edge of wing white ; outer primaries bronzy-brown, paler and becoming white at the base ; secondaries white with greenish-brown tips and white edges which form a double wing-bar ; the innermost secondaries and under tail-coverts white. Bill : upper mandible black with a broad blue-grey band at the tip, lower mandible brown ; iris white ; feet and tarsus grey, all the joints being blackish-brown. Total length 524 mm. ; culmen 46, wing 223, tail 60, tarsus 40.

Adult female. Similar to the adult male but the chestnut less pronounced. Total length 500 mm. ; culmen 44, wing 214, tail 58, tarsus 37.

Nest. " Sometimes a hole or hollow spout of a tree, at other times situated upon the ground in herbage ; if the latter, the nesting-place is lined with grass mixed with down and feathers. Nest-down brownish-grey or greyish-brown, each particle being lighter coloured on the tips and whitish in the centre " (Campbell).

Eggs. " Clutch, eleven to thirteen ; elliptical in shape ; texture of shell comparatively fine ; surface glossy and greasy ; colour, light creamy-white. Dimensions in inches : 2.26-2.27 $\times$ 1.64-1.67 " (Campbell).

Breeding-season. Not recorded.

THERE is little to record of the life-history of this fine Duck which was first described by Eyton in 1838.

Mr. Tom Carter's note reads : " This was one of the commonest species occurring in the Mid-west."

Mr. Sandland writes : " Often seen on the tanks at any period of the year at Balah, South Australia."

Captain S. A. White observes : " These birds are found in great numbers on our lakes ; they are expert divers and seem to collect much food from the

WHITE-EYED DUCK.

bottom of the lakes. I have known them often to prefer to escape by diving than to take to wing. Their food consists chiefly of small fresh-water shell-fish; ninety per cent. of these birds are infested with tapeworms, their intestines containing yards upon yards of these worms."

Mr. J. W. Mellor notes: "Known as the 'Hardhead,' also 'Widgeon' by the colonists, and 'Punkery' by the blacks, they are fairly common in South Australia. I have seen them on Lakes Alexandrina and Albert, at the Reed-beds and various other places. They sometimes collect in flocks of some scores in number and may be seen on the swamps diving and dredging with their bills in the soft mud and aquatic plants, securing their food. They do not seem to nest in these southern districts but depart in the spring, presumably for the more isolated spots, where they can breed unmolested." Later he added: "They breed in the district, as a resident of Lake Albert last season secured a splendid clutch for the Adelaide Museum, containing no fewer than sixteen eggs—a truly large clutch for such a small bird; the eggs resemble the usual duck eggs in colour and shape, but are smaller than the Black Duck and larger than the Teal."

Berney (*Emu*, Vol. VI., p. 157, 1907) regarding Queensland recorded: "A far from common and a shy Duck in these parts, showing up with the summer rains and leaving again as soon as they cease and the outside waters dry up. The stomach (of a male shot January, 1905) was examined by Mr. A. S. Le Souëf, who reported that it contained 'roughly, fifty per cent. gravel, many broken small shell-fish, grass or plant-fibres, no trace of bones or insects.'"

Hall (*Emu*, Vol. IX., p. 78, 1909) has written: "This is one of the two species known as Widgeon or Hardhead. It fishes in conjunction with the Coots (*Fulica australis*). A flock of say 100 will find a large flock of Coots and watch them disturbing the shrimps in order to secure a share. The Coot collects its food below the surface, while the Hardhead catches the shrimp as it jumps in the air. The Hardhead catches two to the Coots' one. This is a Diving Duck and probably the only one that resorts to this method. The Coots appear to do all the work. Mussels form another food, which is found in the clayey banks of the river, into which the Ducks plunge their beaks below the water surface. They prefer timbered lakes. A loud squawk is their signal to rise quickly."

The bird figured and described is a male collected in Victoria in December, 1862.

GENUS—ERISMATURA.

ERISMATURA Bonaparte, Giorn. Arcad. (Roma), Vol.

LII., p. 208, 1832 Type *O. jamaicensis*.

Also spelt—

Erimistura Degland & Gerbe, Orn. Eur., Vol. II., p. 565, 1867.

Oxyura Bonaparte, Annals Lyc. Nat. Hist. New

York, Vol. II., p. 390, 1828 Type *O. jamaicensis*.

Not *Oxyurus* Swainson, 1824.

Gymnura Nuttall, Manual Ornith., Vol. II., p. 426,

1834 Type *O. jamaicensis*.

Plectrura Gistel, Naturg. des Thier. Schul. 1848, p. x. Type *O. jamaicensis*.

ANATINE birds with short bill, short neck, short wings, *long tail of narrow stiff feathers* and short stout legs.

The bill is short, about as long as the head, comparatively deep and somewhat depressed towards tip; on the internal edges of the upper mandible coarse lamellæ occur. The culmen ridge is ill-defined; nostrils are small ovals situated half way towards the tip; the nail is well defined though small and the tip curves rather inwardly. The under mandible is rather narrow, the interramal tract being unfeathered and the anterior portion is not separated, though long.

The wing is short, the feathers very narrow; the first three primaries are almost subequal, the first slightly longest.

The tail is composed of sixteen stiff pointed feathers, the upper tail-coverts being short and insignificant. It is less than half the length of the wing, but half as long again as the culmen or metatarsus.

The legs are very short and stout, entirely covered with reticulate scales; the metatarsus is about equal to the culmen and about one-fourth the length of the wing. The toes are very long and fully webbed, the outer toe being longest; the middle toe is as long as the tail, while the hind toe is small, with a small lobe.

In the *Nov. Zool.*, Vol. XVIII., p. 9, 1911, I preferred *Oxyura* to *Erismatura*, as the former had been rejected owing to the prior *Oxyurus*; according to the International Code both these names should be preserved.

ERISMATURA.

The Code of the American Ornithologists' Union admitted one of these only, and upon my protest it was pointed out that no Rule was transgressed, only a Recommendation. The rejection of this recommendation would seem imminent, as it is not being adhered to by the great majority of working scientists. I am here using *Erismatura* in accordance with the usage of the American Ornithologists' Union.

In the same place, I noted that *Cerconectes* has apparent priority over *Erismatura*, and this I think is true, but I now consider the type species of *Cerconectes* generically distinct from that of *Erismatura*.

ERISMATURA AUSTRALIS.

BLUE-BILLED DUCK.

(PLATE 217.)*

OXYURA AUSTRALIS Gould, Proc. Zool. Soc. (Lond.) 1836, p. 85; Swan River, West Australia.

Oxyura australis Gould, Proc. Zool. Soc. (Lond.) 1836, p. 85; *id.*, Synops. Birds Austr., pt. II., pl. 36, 1837; Mathews, Nov. Zool., Vol. XVIII., p. 239, 1912; *id.*, List Birds Austr., p. 94, 1913.

Erismatura australis Eyton, Monogr. Anat., p. 172, 1838; Gray, List Birds Brit. Mus., pt. III., p. 146, 1844; *id.*, Genera Birds, Vol. III., p. 627, 1844; Gould, Birds Austr., Vol. VII., pl. 17, 1844; Reichenbach, Synops. Av. Natat., pl. 78, figs. 902-3, 1845; Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 652, 1856; Gould, Handb. Birds Austr., Vol. II., p. 379, 1865; Gray, Handl. Gen. Sp. Birds, pt. III., p. 90, 1871; Ramsay, Proc. Linn. Soc. N.S.W., Vol. I., pp. 196, 220, 1877; *id.*, *ib.*, Vol. II., p. 200, 1878; Sclater, Proc. Zool. Soc. (Lond.) 1880, p. 530; Ramsay, Tab. List Austr. Birds, p. 22, 1888; North, Austr. Mus. Cat., no. 12, p. 346, 1890; Heine and Reichenow, Nomencl. Mus. Hein. Orn., p. 349, 1890; Bennett, Ibis 1891, pp. 143-5; North, Rec. Austr. Mus., Vol. II., p. 37, 1892; Salvadori, Cat. Birds Brit. Mus., Vol. XXVII., p. 451, 1895; Hall, Key Birds Austr., p. 108, 1899; Mathews, Handl. Birds Austral., p. 36, 1908; Littler, Handb. Birds Tasm., p. 227, 1910; Stone, Emu, Vol. XII., p. 121, 1912; Orton and Sandland, *ib.*, Vol. XIII., p. 76, 1913; North, Austr. Mus. Spec. Cat., no. 1, Vol. IV., p. 92, 1913.

Clangula (Oxyura) australis Selby, Cat. Gen. Subgen. Aves, p. 47, 1840.

Biziura australis Schlegel, Mus. Pays-Bas, Vol. VI., Anseres, p. 11, 1866; Giebel, Thes. Ornith., Vol. I., p. 467, 1872.

Oxyura australis victoriae Mathews, Austral Av. Rec., Vol. I., p. 87, 1912; Victoria.

Oxyura australis australis Mathews, *ib.*

RANGE. New South Wales; Victoria; Tasmania; South Australia; West Australia.

Adult male. Upper-surface, breast, and sides of the body rich chestnut-brown becoming darker and inclining to black on the rump and upper tail-coverts and long scapulars which are vermiculated or barred with buff; tail pale chestnut-brown; quills also dark chestnut-brown paler on the inner webs; entire head and neck glossy black; breast and abdomen dusky brown with buff or silvery white tips to

* The Plate is lettered *Oxyura australis*.



H. Grönvold, del

Witherby & Co

$\frac{1}{3}$
OXYURA AUSTRALIS.
(BLUE-BILLED DUCK).

BLUE-BILLED DUCK.

the feathers ; axillaries pale brown edged with white ; under wing-coverts greyish-brown tipped with white. Bill light blue ; iris very dark brown ; front and inner sides of tarsus and toes french grey, outside of tarsus and webs blackish-grey. Total length 440 mm. ; culmen 41, wing 151, tail 66, tarsus 35.

Adult female. Entire upper-surface dark brown barred and vermiculated with white or buffy-white ; under-surface dusky brown with silvery white tips to the feathers. Bill dark olive-green, under mandible lighter. Total length 415 mm. ; culmen 40, wing 150, tail 65, tarsus 35.

Immature male. Differs in having the head and back browner with buff bars or vermiculations and the under-surface more silvery white.

Nestling. Sooty brown above, darker on the crown of the head ; a spot of white on each wing and also on each side of the back and sides of the rump ; a pale line on each side of the head above the ear-coverts ; under-surface whitish with a dusky bar across the fore-neck.

Nest. "Resembles that of *B. lobata*, large, with the flags bent down and interlaced, lined with down from the parent" (S. A. White).

Eggs. "Clutch, four to five probably ; elliptically inclined in shape ; texture of shell coarse, surface very slightly glossy and rough ; colour, light greenish-white. Dimensions in inches : 2.59-2.81 $\times$ 1.84-2.07" (Campbell).

Breeding-season. "November and December" (S. A. White, South Australia).

LITTLE is known of the economy of this rare Duck which was first described by Gould from West Australia.

Captain S. A. White has communicated to me the following : "I have never seen this bird in any great numbers in any one place, fifteen to twenty is as many as I have seen together ; as the breeding-season approaches they disperse in pairs over the lakes and become very shy though they are a shy bird at any time. They seem to like the company of the Musk Duck, *B. lobata*, and other ducks, and I have seen them playing together on the water. I have been trying for many years to get the eggs of this duck, but it was not until November, 1909, that I succeeded. Although I have often seen the ducks about in the swamps, hunt as much as I like, I could never strike their nest. Hunting about on November 19, up to the arm-pits in water amongst thick flags and reeds a large bird flopped into the water from a thick mass of broken-down flags and dived away out of sight : approaching the mass of dead flags and searching it well a neat opening was seen, and in a well-lined nest of down were the eggs, very like those of *B. lobata* but much smaller. Leaving the locality without touching the nest I returned some hours later with a gun : the bird left the nest in the same way as before, but showed herself for a moment as she came up, giving time to get a shot which proved her identity without a doubt. The nest was a large structure resembling a well-built *B. lobata* nest ; the flags were bent down and interlaced, and the inside was lined with down from the duck. I was only able to procure one more clutch which was found in somewhat the same way. The one taken

THE BIRDS OF AUSTRALIA.

on Nov. 19, 1909, I sent to H. L. White, Esq., Scone, N.S.W., for up to that time he had been unable to get these eggs. The birds lay from four to six eggs and are very late in the season, for November and December seem to be the months they lay in South Australia. Both the nests I speak of were taken in the swamps near Murray Bridge, South Australia, and these swamps are now reclaimed by the Government and are growing lucerne to-day."

Mr. J. W. Mellor writes: "The Blue-billed Duck is a step away from the general family and linking on to the Musk Duck, it being very closely allied in its habits and nidification to the last-named species and in some districts it is known as the little Musk Duck. The birds are fairly numerous on large waters of a permanent nature, where they dive and sport about in the water much in the way of the Musk Duck, the stiff feathers being impervious to the water, and it can stay below the surface for a long time without inconvenience. They are to be found on the River Murray and Lakes Alexandrina and Albert where they have been known to breed, but the eggs are a rarity in all collections as the nests are rarely found."

Both these scant notes confirm Gould's notes (*Handb. Birds of Austr.*, Vol. II., p. 379, 1865) which I reprint for comparison, showing the little advancement made in our knowledge of the life-history of this bird in fifty years: "This bird would appear to be so limited in its habitat as to be confined to the colony of Western Australia; at least up to this time it has not been discovered in any other part of the country. Gilbert's notes inform me that it is never seen in the rivers, either those communicating with the sea or those of the interior, and that it is only found on the lakes running parallel to and near the coast that are surrounded with high reeds and tea-trees. Its general habits resemble those of *Biziura lobata*; like that bird it possesses the power of remaining under water for a great length of time, and if closely hunted flaps along the surface without taking wing. Its voice is a peculiar inward tone, which the natives describe by saying, 'it has no voice, but makes a noise with its heart.'"

Legge (*Emu*, Vol. IV., p. 108, 1905) records: "This remarkable duck, which is extremely rare in the lowlands and first recorded from Tasmania in 1892, was not uncommon on the Great Lake, which can be looked upon as its great stronghold in this country. It was fond of taking shelter in little bays of the islands, sometimes sitting on the rocks, from which it would launch itself with a clumsy flight for a short distance, and then proceed further into the open water by diving. Five or six were seen in a flock occasionally."

The bird figured and described is a male collected on Herdsman's Lake, West Australia, on the 10th of February, 1902.

GENUS—B I Z I U R A .

BIZIURA Stephens, in Shaw's Gen. Zool., Vol. XII., pt. II.,

p. 221, 1824 Type *B. lobata*.

Also spelt—

Bizeura Eyton, Annals Mag. Nat. Hist., Vol. VII., p. 177, 1841.

Hydrobates Temminck and Laugier, Plan. Color d'Ois.,

68^e livr., Vol. IV., pl. 406, 1826 (not *Hydrobates*

Boie, 1882) Type *B. lobata*.

Also spelt—

Hygrobates Lichtenstein, Verz. samml. Neuholland, p. 6, 1837.

LARGE Anatine birds with very short, deep broad bill, with a leathery lobe hanging from the interramal space, short wings, long stiff tail, short stout legs and feet.

The bill is very short, shorter than the head, very deep and broad; it is steeply conical and from the fore-head to the gape runs back sharply, the measurement from gape to tip exceeding that from tip to the frontal feathers by less than half the chord of the culmen. The nostrils are small ovals placed about half-way from the tip on each side of a very ill-defined culmen ridge; the nail is broad, not distinctly differentiated and little overhanging. The lateral edges of the upper mandible are straight, furnished internally with comb-like lamellæ. The under mandible is very broad, the rami enclosing a triangular unfeathered tract from which depends a nearly circular, leathery lobe, very much developed in the male but less so in the female which is also a smaller bird; the rami are flattened and the nail obscurely marked.

The head carries a short "mane" and the neck is short.

The wing is short, the feathers narrow and pointed with the second primary longest, the first longer than the fourth but less than the third.

The tail consists of twenty-four stiff narrow feathers, the upper tail-coverts are short and insignificant; the tail is about half the length of the wing.

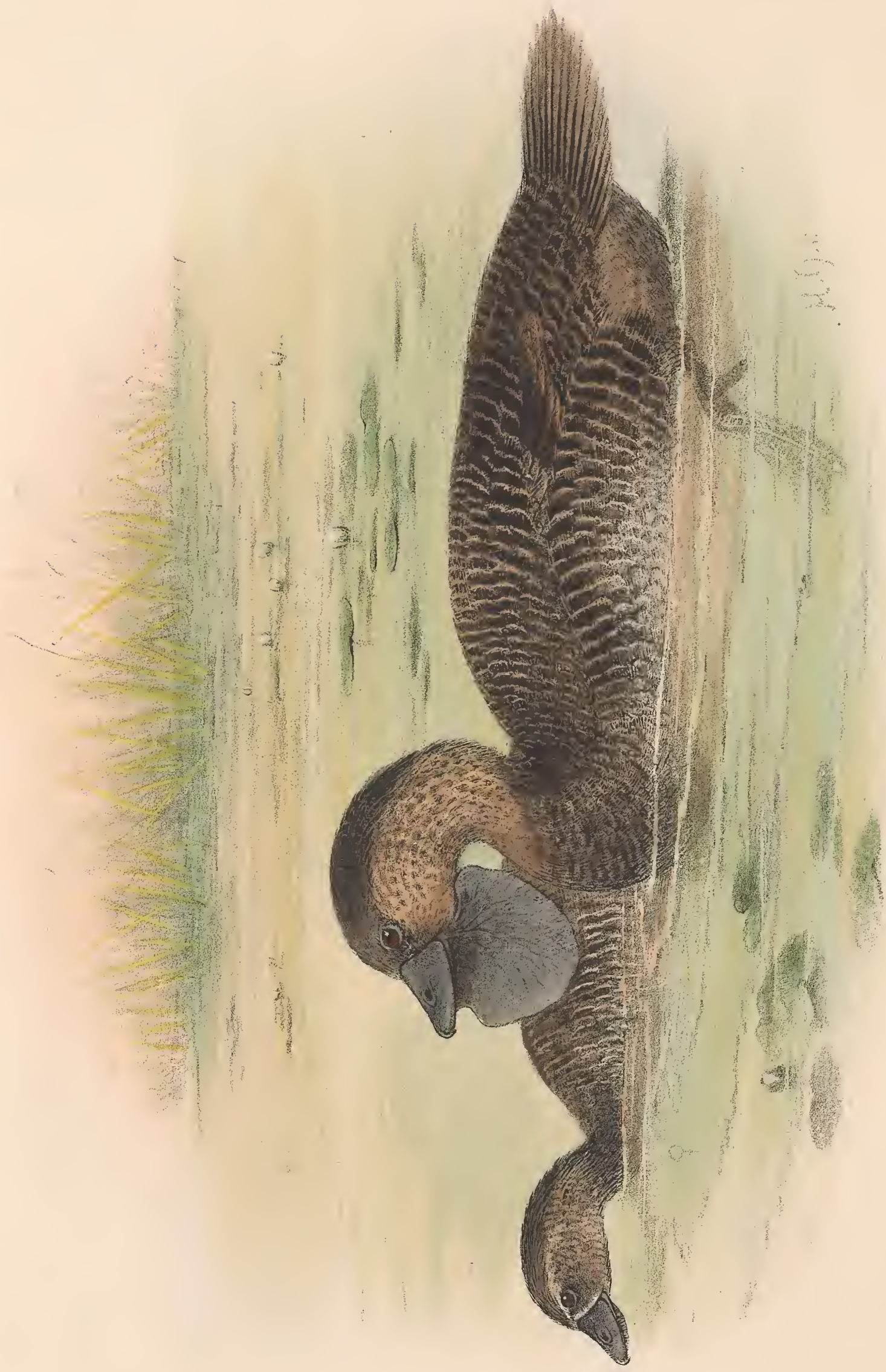
The legs are short and stout; the metatarsus covered with reticulate scales, a little coarser in front, but not scutes; the metatarsus is about half the length of the tail and longer than the culmen.

The toes are very stout and long, fully webbed; the outer toe is subequal with the middle, which is more than one-third the length of the wing or twice the chord of the culmen. The hind toe is short and strongly lobed.

I have already suggested that this Duck shows such superficial features that anatomical investigation would force its separation from the *Erismaturinæ* into a separate subfamily.

THE BIRDS OF AUSTRALIA.

Eyton's notes on its anatomy showed that it possessed many peculiar characters, but Forbes when he studied the bird did not emphasize any of these, though he observed some without comment. In the nestling the peculiar interramal lobe is well marked, so that this must be a very ancient feature. That such a strange character should be accompanied by others equally as unusual would be a commonplace conclusion, and an anatomical study of the nestling by a competent worker would be a welcome addition to our present knowledge.



H. Grönvold, del.

Witherby & Co.

$\frac{1}{3}$
BIZIURA WESTRALIS.
(WESTERN MUSK-DUCK).

BIZIURA LOBATA LOBATA.

WESTERN MUSK DUCK.

(PLATE 218.)*

ANAS LOBATA Shaw and Nodder, Naturalists' Miscellany, Vol. VIII., pl. 255, 1796 ;
King George's Sound, West Australia.

Anas lobata Shaw and Nodder, Nat. Miscell., Vol. VIII., pl. 255, 1796 ; Dumont, Dict.
Sci. Nat. (Levrault), Vol. VI., p. 387, 1817 ; Lesson, Traité d'Orn., p. 630, 1831.

Lobated Duck Latham, Gen. Synops. Birds Suppl., Vol. II., p. 349, 1801.

Anas carunculata (not Illiger 1811) Vieillot, Nouv. Dict. d'Hist. Nat., Vol. V., p. 109, 1816
(West Australia) ; *id.*, Tabl. Ency. Meth. Orn., Vol. I., p. 356, pl. 236, fig. 2, 1820.

Biziura novæhollandiæ Stephens in Shaw's Gen. Zool., Vol. XII., pt. II., p. 222, fig. in
frontispiece 1824 (West Australia).

Hydrobates lobatus Temminck and Laugier, Plan. Color d'Ois., 68^e livr., Vol. IV., pl. 406,
1826 ; Lesson, Manuel d'Orn., Vol. II., p. 414, 1828 ; Breton, Proc. Zool. Soc.
(Lond.) 1834, p. 19 ; Lesson, Compl. de Buff. Ois., Vol. IX., p. 529, 1837.

Hygrobates lobatus Lichtenstein, Verz. samml. Neuholl., p. 6, 1837.

Biziura lobata Eyton, Monogr. Anatidæ, p. 168, 1838 ; Gray, List Genera Birds, p. 75,
1840 ; *id.*, *ib.*, 2nd ed., p. 96, 1841 ; *id.*, List Birds Brit. Mus., pt. III., p. 145, 1844 ;
id., Genera Birds, Vol. III., p. 627, 1844 ; Gould, Birds Austr., Vol. VII., pl. 18,
1844 (part) ; Reichenbach, Synops. Av. Natat., pl. 81, figs. 145-6 and 904, 1845 ;
Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLIII., p. 652, 1856 ; Gould, Handb.
Birds Austr., Vol. II., p. 381, 1865 (part) ; Schlegel, Mus. Pays-Bas, Anseres, Vol.
VI., p. 7, 1866 ; Gray, Handl. Gen. Sp. Birds, pt. III., p. 90, 1871 ; Giebel, Thes.
Ornith., Vol. I., p. 467, 1872 ; Sundevall, Meth. Nat. Av. Disp. Tent., p. 150, 1872 ;
Ramsay, Proc. Linn. Soc. N.S.W., Vol. II., p. 200, 1878 (part) ; Selater, Proc. Zool.
Soc. (Lond.) 1880, pp. 529, 535 ; *id.*, *ib.*, 1882, p. 311 ; Forbes, *ib.*, pp. 455-8 ;
Ramsay, Tab. List Austr. Birds, p. 22, 1888 (part) ; Heine and Reichenow,
Nomencl. Mus. Hein. Orn., p. 349, 1890 (part) ; Salvadori, Cat. Birds Brit. Mus.,
Vol. XXVII., p. 452, 1895 (part) ; Hall, Key Birds Austr., p. 108, 1899 (part) ;
Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 1053, 1901 (part) ; Carter,
Emu, Vol. III., p. 212, 1904 ; Hall, Key Birds Austr., 2nd ed., p. 108, 1906
(part) ; Mathews, Handl. Birds Austral., p. 37, 1908 (part) ; Ogilvie-Grant, Ibis
1910, p. 173 ; Mathews, Nov. Zool., Vol. XVIII., p. 240, 1912 (part) ; North,

* The Plate is lettered *Biziura westralis*.

THE BIRDS OF AUSTRALIA.

Austr. Mus. Spec. Cat., no. 1, Vol. IV., p. 94, 1913 (part); Orton and Sandland, Emu, Vol. XIII., p. 76, 1913; Mathews, List Birds Austr., p. 94, 1913 (part).

Oidemia (Hydrobates) lobatus Selby, Cat. Gen. Subgen. Aves, p. 47, 1840.

Biziura lobata westralis Mathews, Austral Av. Rec., Vol. I., p. 87, 1912; West Australia.

Biziura lobata lobata Mathews, *ib.*

DISTRIBUTION. West Australia.

Adult male. General colour above blackish-brown barred with buff like the fore-neck and the sides of the body, the remainder of the under-surface a little paler brown, wings similar in colour to the back but almost uniform; crown of the head and the hind-neck glossy black with spine-like feathers on the fore-head; axillaries barred with pale brown and white; quill-lining pale grey; tail-feathers much stiffened, black in colour and lanceolate in form. Bill dark blue-grey; eyes reddish-hazel; legs and feet lead-grey. Total length 690 mm.; culmen 40, wing 220, tail 106, tarsus 54.

Adult female. Similar to the adult male but smaller and having the crown of the head brown instead of black. Total length 490 mm.; culmen 34, wing 185, tail 87, tarsus 41.

Nestling-in-down. Sooty black on the entire upper-surface, throat and fore-neck; breast and abdomen dull white.

Having a series of twelve specimens of both male and female in my collection, I notice that there is a great difference in the size of the lobe which varies from three inches in the breeding bird to a quarter of an inch in non-breeding plumage. I observe, too, that the birds with the larger lobe are very dark below, whereas those with the smaller size are much greyer on the under-surface. I imagine, therefore, that the latter must be the winter plumage.

Nest. A large structure somewhat similar to that of the Eastern bird.

Eggs. Similar to those of the Eastern bird.

THIS bird was figured and described by Shaw and Nodder in the Naturalists' Miscellany, Vol. VIII., pl. 255, 1796, under the name *Anas lobata*, when they wrote: "This curious species is a native of New Holland, and is about the size of a common Duck. The specimen is preserved in the British Museum, and was brought over by Mr. Archibald Menzies, who accompanied Captain Vancouver in his late voyage."

The latter sentence escaped my notice when I made up my "Reference List" and I there designated New South Wales as the type locality, as the majority of the earlier birds received from Australia came from that locality. A recent reference to the Naturalists' Miscellany enabled me to rectify this error, as a slight knowledge of the history of the early Investigators was sufficient to show that this was wrong: Captain Vancouver never went to New South Wales but simply called at West Australia and went from there to New Zealand.

I at once looked up Vancouver's "Voyage" to see if any reference was made to this bird, and on p. 52 of Vol. I., 1798, I noted: "October, 1791. King George Sound, West Australia. Though ducks were in great numbers,

WESTERN MUSK DUCK.

we were very unsuccessful in taking them. A very peculiar one was shot, of a darkish grey plumage, with a bag like that of a lizard hanging under its throat, which smelt so intolerably of musk that it scented nearly the whole ship."

This fixes exactly the locality, and I further found that Mr. Archibald Menzies was surgeon and botanist, and this is certainly the bird Shaw and Nodder described. All the synonyms were based upon this bird, so that no name is available for the Eastern bird as I named the Western form also, accepting the wrong East type locality.

In the *Proc. Zool. Soc.* (Lond.) 1834, p. 19, there is a letter from Lieut. Breton stating: "These birds are so extremely rare, that he saw only three of them during his various excursions, which extended over twelve hundred miles of country. He had never heard of any instance in which more than two were seen together. They are met with only on the rivers, and in pools left in the otherwise dry beds of streams. It is extremely difficult to shoot them, on account of the readiness with which they dive: the instant the trigger is drawn, the bird is under water."

Mr. Tom Carter writes: "A common species throughout the South-west, but only once seen by me in the Mid-west. December 10, 1912. I saw one on the Roads Board water tank (about twenty yards square) close to Broome Hill township and alongside a much frequented high road."

Mr. A. W. Milligan (*Emu*, Vol. II., p. 106, 1902) has observed: "A company of these birds, numbering some eight or nine, were moving about the shallows on the South Perth side, about 100 yards from the course of the ferry boat. My attention was drawn by a succession of 'ponks,' intermingled with similar monosyllabic notes, which appeared to be the same sound stripped of its resonance. The surmise proved to be correct, as I plainly perceived. The 'ponk' followed the action of the bird (which appeared to be the male bird disporting himself before the females) when he thrust his head quickly under the water. Simultaneously with the thrusting of the head under the water the bird struck the water with the feet and swished the tail. The lighter and less resonant sound was uttered above water, and was accompanied with a prolongation of the neck and a lateral swish of the tail. It is quite probable that the striking of the water with the foot, mentioned in the former case, has given rise to the local idea that the sound was produced by such action and not in the normal way."

In the *Austral Avian Record*, Vol. I., p. 87, 1912, I separated the Eastern form from the Western Musk Duck, and accepting the Eastern bird as typical, named the Western one. In my *List of the Birds of Australia*, 1913, p. 94, I lumped them as there did not seem to be enough differences, as the species

THE BIRDS OF AUSTRALIA.

seemed to show considerable variation which I was unable to account for. I have again studied these birds and I think that the differences observed seem constant, notwithstanding the plumage variation which appears due to age.

I have separated the two forms and anticipate that more material will emphasize the differences. It will be observed that little is known of the economics of either race, but that particularly we know nothing of that of the typical or Western form.

The bird figured and described is a male collected on Herdsman's Lake, West Australia, on the 7th of September, 1901, and is the type of *westralis*.

BIZIURA LOBATA MENZIESI.

EASTERN MUSK DUCK

BIZIURA LOBATA MENZIESI Mathews, Austral Av. Rec., Vol. II., p. 90, 1914 ; New South Wales.

Biziura lobata Gould, Birds Austr., Vol. VII., pl. 18, 1844 (part) ; Stokes, Discov. in Austr., Vol. I., App., p. 483, 1846 ; Sturt, Narr. Exped. Cent. Austr., Vol. II., App., p. 57, 1849 ; Blyth, Cat. Birds Mus. As. Soc. Beng., p. 308, 1852 ; Pelzeln, Reise Novara Vögel., p. 139, 1865 ; Gould, Handb. Birds Austr., Vol. II., p. 381, 1865 (part) ; Ramsay, Ibis 1867, p. 413, pl. viii., fig. 1 (egg) ; Müller, Proc. Zool. Soc. (Lond.) 1869, p. 280 ; Diggles, Birds Austr., Vol. II., pl. 117, 1877 ; Ramsay, Proc. Linn. Soc. N.S.W., Vol. I., pp. 196, 216, 219, 1877 ; Saunders, Ibis 1883, p. 351 ; Legge, Papers Proc. Roy. Soc. Tasm. 1886, p. 245, 1887 ; *id.*, *ib.*, 1887, p. 97, 1888 ; Ramsay, Tab. List Austr. Birds, p. 22, 1888 (part) ; North, Austr. Mus. Cat., no. 12, p. 346, 1890 ; Heine and Reichenow, Mus. Hein. Orn., p. 349, 1890 (part) ; Bennett, Ibis 1891, p. 145 ; Hartert, Katal. Vögels Mus. Senckenb., p. 233, 1891 ; Salvadori, Cat. Birds Brit. Mus., Vol. XXVII., p. 452, 1895 (part) ; Hall, Key Birds Austr., p. 108, 1899 (part) ; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 1053, 1901 (part) ; Hill, Emu, Vol. II., p. 167, 1903 ; Littler, *ib.*, Vol. III., p. 216, 1904 ; Legge, *ib.*, Vol. IV., p. 108, 1905 ; D'Ombraïn, *ib.*, p. 163, 1905 ; Hall, Key Birds Austr., 2nd ed., p. 108, 1906 (part) ; Batey, Emu, Vol. VII., p. 17, 1907 ; Mathews, Handl. Birds Austral., p. 37, 1908 (part) ; Fletcher, Emu, Vol. VIII., p. 213, 1909 ; Broadbent, *ib.*, Vol. X., p. 245, 1910 ; Littler, Handb. Birds Tasm., p. 228, 1910 ; Mathews, Nov. Zool., Vol. XVIII., p. 240, 1912 (part) ; Stone, Emu, Vol. XII., p. 121, 1912 ; White, *ib.*, Vol. XII., p. 161, 1913 ; North, Austr. Mus. Spec. Cat., no. 1, Vol. IV., p. 94, 1913 (part) ; Stone, Emu, Vol. XIII., p. 83, 1913 ; Mathews, List Birds Austr., p. 94, 1913 (part) ; White, Emu, Vol. XIII., p. 124, 1914.

Biziura lobata menziesi Mathews, Austral Av. Rec., Vol. II., p. 90, 1914.

DISTRIBUTION. New South Wales ; Victoria ; Tasmania ; South Australia.

Adult male. Differs from *B. l. lobata* in being lighter and the bands on the back being white instead of buff ; the lobe under the bill is also smaller.

Female. Similar to the female of *B. l. lobata*.

Nest. Placed in the reeds, and formed by bending them so as to form a nest lined with grass and down ; egg cavity measured three inches deep by six inches wide.

THE BIRDS OF AUSTRALIA.

Eggs. Clutch, two or three; ground-colour pale green; surface rough and slightly glossy. Axis 75-84 mm.; diameter 52-54.

Breeding-season. August to December.

I HAVE more notes than usual in connection with this Duck, as it has been more closely observed on account of its many peculiarities, but it will be conceded that really little is known of its life-history, and yet a more interesting topic for study could scarcely be found.

Miss J. Fletcher has written from Tasmania: "In the Cleveland Lagoon one old Drake was quite a familiar feature. He used to swim over the open water at a great pace and evidently enjoyed himself, as he would travel backwards and forwards across the same stretch of water. The noise he made could be heard plainly at the edges and occasionally he would give a grunt. In Diprose Lagoon these Ducks would be swimming about and when observed would dive and come up further on or seek shelter in the rushes. They appeared to eat the white masses of frogs' spawn which at certain times is found clinging to the reeds. From the observations of my sisters and myself, I have come to the conclusion that the female does not build or make her nest until she actually requires it and the first egg is sometimes laid in the unfinished nest. When the second egg is laid, down is added, and by the time incubation is finished the nest is indeed snug. When robbed, the bird after a week or so makes a nest in almost the next clump of reeds. Should misfortune attend this clutch she sometimes returns to the first nest. I have noted three instances where the Musk Duck made her nest under that of a Swamp Hawk (*Circus gouldi*), probably because the latter generally chooses thick clumps of reeds on which to place her nest. The Musk Duck lays an egg every day and as a rule sits as soon as the second egg is laid. Clumps of reeds surrounding or bordering lakelets in the lagoons are favoured localities. When disturbed the female dives straight from the mouth of the nest into the water below and so gets away. A tiny reed-covered lagoon in extent about two acres was too deep to search at the beginning of the season. At the end of November an examination revealed eleven nests of these Ducks with hatched egg-shells, and judging by the egg-shell fragments several clutches must have been composed of three eggs. Never once have I been lucky enough to see the ducklings swimming about. In one instance a musk duck had laid her clutch of three in a nest in which had been left a last season's egg. This egg I broke and found in it a full-grown duckling covered with black down, and with bill, feet and legs black. It was too putrid to put in spirits. The lagoons were constantly rising, owing to the frequent heavy rains, and in several of the nests the eggs were really in water. I weighed

EASTERN MUSK DUCK.

three clutches of eggs. Two sets of two eggs each weighed one pound exactly, while a clutch of three turned the scale at one and a half pounds. These sets were fresh. One of the two clutches is the one I sent you."

Mr. Edwin Ashby has sent me the following interesting note: "On two occasions we surprised a little one only recently hatched, and were much interested in seeing the little fellow swim at its utmost speed to the side of its father and then clamber up on his back and go off pig-a-back. It was quite a comical sight to see the little chap perched up on the back of its parent and being floated off into a place of safety. On one occasion we dropped on to a little hatchling (that seems a better word than fledgling for a bird that does not fly) and decided to row him down. The pace he paddled was something great, but our oars were too much for him; so he doubled back and dodged us round and round and in and out of a small bush, uttering all the time cries of distress, between a scream and a quack."

Captain S. A. White writes: "When hunting in the swamps I saw a great deal of these birds, and many of their ways are very quaint. I have seen the male place his bill on his tail and then propel himself at a great speed in a circular motion keeping it up for quite a time. They build their nests in the thickest part of the flags, bending them down and interlacing them with others, forming a nice snug nest well lined with their own down. Yet I have found nests of the rudest construction possible in quite exposed positions. The number of eggs varies very much; two eggs have often been found well incubated, and it is not uncommon to find six eggs in a clutch."

The following note by Captain White (*Emu*, Vol. IX., p. 166, 1910) seems worthy of reproduction: "I am not aware if any of the readers of *The Emu* ever noticed that when the Musk-Duck (*Biziura lobata*) makes the deep-toned note it also throws out a jet of water on either side, caused evidently by a rapid motion of the feet. This occurrence has often puzzled me, but of late a peculiar incident came under observation. A Bald-Coot (*Porphyrio melanonotus*) which had been wounded, was observed to be making frantic efforts to escape from a Hawk. The latter bird had made up its mind to have that Coot at all risks, and was making drive after drive, in its characteristic manner, to tire out the Coot, and at each rush the Coot was seen to edge closer and closer to a fine old male Musk-Duck who was placidly floating in the deep water, caring not a straw for the Hawk. At last the poor terrified Coot reached the Duck's side, and as the Hawk renewed its charges, attempting to hit its victim on the head with its powerful wing, the Coot dodged from one side of the Duck to the other, and it was now that

THE BIRDS OF AUSTRALIA.

the Musk-Duck began to take an active part; for, strange to say, every time the Hawk made a swoop down upon the Coot the old Duck gave forth a deep sound and splashed up the water behind him, and the time was so well judged that the Hawk received the full force of the water. Three desperate efforts were made, but after the third dousing the Hawk took himself off in disgust, but the old Musk-Duck floated on in his majestic style as if nothing had occurred or he had not saved the life of a wounded friend."

Mr. A. G. Campbell confirms Capt. White's account of their (probably) nuptial display thus: "The male bird is very fond of showing off while on its inland nesting haunts. With head thrown back, pouch inflated and tail spread out over its back it spins around in the water, looking more like a huge shuttlecock than a duck. It varies the performance by scooping quantities of water into the air with its feet. The splash it makes would do credit to a much larger bird."

Mr. J. W. Mellor states: "These birds will not live in captivity as they require a wide scope of water in which to procure their food: they are expert divers, and resemble the cormorant in their dexterity in the water in which they practically live. It is simply surprising to watch them dive and the distance they will swim underneath the water before making their appearance again on the surface, and then only a head and neck, if they are pursued, and down again if danger is still near. The drake gives off a peculiar musky odour while sporting in the water and I have frequently become aware of the presence of the birds by the smell of this odour alone. They are a cumbersome or coarse-fleshed bird, and seldom or never take to the wing, depending solely to their diving and swimming powers to save them from being captured or killed. They are hard to kill, as they are under the water before the shot from the gun reaches them. I have seen them plentifully dispersed over the Lakes Alexandrina and Albert, also up the River Murray: they also take to the sea and sport in the bays and inlets where the water is comparatively quiet. When disturbed they flap along the top of the water with remarkable rapidity, going sometimes quite a quarter of a mile or more before settling down again: they go along in this way by means of their legs and wings and seem to simply walk on the water."

In the *Emu*, Vol. II., p. 210, 1903, A. G. Campbell notes at King Island: "When swimming fast to get away from an intruder, like a ship at high speed, this bird sinks deeply into the water, only the head and neck being visible."

Mr. A. J. Campbell instigated a discussion as to the question of flight by these birds and gives a long account of his results in his *Nests and Eggs*.

EASTERN MUSK DUCK.

There can be no further question as to their flying both strongly and swiftly, but they apparently do not commonly indulge in this practice during the day but are not averse to flight in the evening.

A single addition to Campbell's many records may be cited.

Mr. C. G. Hamilton in the *Emu*, Vol. I., p. 147, 1902, writes: "We had a shooting trip lately, and I was with a friend when he shot a Musk-Duck in mistake for a Black Duck. The bird was flying high over us, and was going very fast. It must have come from another swamp, which is about a mile distant. This occurred *just at dusk*."

ORDER—PELECANIFORMES.

THIS Order cannot be regarded as superficially a homogeneous assemblage—a term I used in connection with the preceding Order. Heterogeneous would seem to be a more appropriate term, but upon deeper study the apparent polyphyletic association becomes less marked, though still negative features seem to predominate in grouping the varied forms here classed together. In the case of the *Anseriformes* the Order was coincident with one family. In the present case, six very distinct families are admitted, and in the *Catalogue* of the Birds in the British Museum, where the Order was monographed by that conservative worker Mr. W. R. Ogilvie-Grant in 1898, five families and one subfamily still appear; when it is noted that each family and subfamily are not further subdivided but all the species, few or many, in each division are referred to a single genus, the term conservative will not seem ill-applied.

Linné, in 1758, admitted two genera, but Brisson in 1760 admitted five of the six genera Ogilvie-Grant used in 1898; such a remarkable instance of conservatism surely cannot be equalled in any other branch of science. This is merely due to the inability to separate family characters from those of less value, a common enough error made by careless workers when dealing with large birds, and one that has persisted, on the score of convenience, for 150 years. The lumping school of the present day use these indefinite genera as it makes progress easy, and difficult problems connected with the phylogenetic evolution of groups are thereby shirked. The disposal of a bird in this manner retards progress and no advance in the history of the evolution of the bird group is made, but confusion perpetuated to the sorrow of the philosophical worker. The determination of subspecific forms seems to be the all-in-all of some present day workers, and when such provide geographical papers of no value from a philosophical point of view they fail to adduce any conclusions produced by their efforts. Monography is scarcely indulged in, the *Catalogue* of the Birds of the British Museum being the best attempt, but of course that was primarily a Catalogue, and though serious efforts were made by some of the compilers to produce permanent records others were as careless of the result obtained. In the present work I am unable to monograph the birds of the world, but I hope to deal thoroughly with all the endemic groups, which will now shortly come under consideration.

PELECANIFORMES.

The preceding remarks were induced through the study of this Order. Ogilvie-Grant, in 1898, scarcely modified the Brissonian genera of 1760, and because this expression of reaction was published in the *Catalogue* of the Birds of the British Museum it has been widely accepted. In the preceding Order I pointed out that the work in the *Catalogue* of the Birds of the British Museum had been performed by Count Salvadori, a careful and accurate worker and a genus-splitter, and that his genera had been generally maintained without criticism; in the present Order the compiler was a genus-lumper, and the genera, though obviously polyphyletic, have been as uncritically utilised.

Many good workers had previously effected subdivision of the Brissonian genera, but these Ogilvie-Grant quite ignored: in my opinion subdivision is necessary and the genera utilised by Ogilvie-Grant do not portray the facts.

As instance, the genus *Sula* has the range "Temperate and Tropical seas." This does not indicate that some forms, which to me constitute a genus, are confined to Temperate seas and are never found in the Tropics, and that others are confined to the Tropics and never live in the Temperate regions. These groups differ in many important characters which are constant in widely separated areas. I will deal with these later, but simply note the above in passing.

If the differences here observed are not of generic value what must the confusion become when the Passeriformes are examined with a similar standard? For some inexplicable reason a combination of different colours becomes sufficient when a Passerine bird is examined; e.g. Ogilvie-Grant himself recently proposed a new genus *Pseudacanthis*, the main generic feature being that it looked something like a Linnet but not quite; it didn't have a red head. Without prejudice it would look more like a Linnet than some Gannets resemble each other. But really the reverse is the truth: a small difference in an ancient form like a Gannet would mean much greater difference from an evolutionary view-point than a huge difference in a recent product like a small Passerine bird. I can only conclude that the generic and subgeneric differentiation of birds is as important, or more so, as the subspecific differentiation so freely indulged in. It must be more useful from a geographical point of view (which subspecies-makers so highly extol), to remark that a country has evolved, or is inhabited by, a different type of bird than that it has only produced a slightly differently coloured form. The latter are so very easily modified by climate that in Australia, where hundreds of different fairly permanent climatic conditions exist, hundreds of subspecies are co-existent. Lack of study of such by extra-limital workers acquainted

THE BIRDS OF AUSTRALIA.

only with their own rather permanent and little changing weather conditions has caused them to seriously blunder when confronted with Australian birds. Many instances will later be shown.

In the present Order the birds constituting it are all Ancient types, and as such have become fixed, showing several generic forms but not many easily discernible subspecific alterations. As a matter of fact, Ogilvie-Grant hardly recognised any, but then in his case a strong prejudice against such was allowed to obscure his judgment.

The study of juvenile forms immensely helps in the determination of phylogenetic relationships, but such has not yet been undertaken seriously by any British ornithologist who should be able to command long series showing plumage growth from nestling to adult *but who generally cannot*. The recent discussion with regard to the plumage changes of the Common Cormorant of the British Isles gives a clear confirmation of the preceding remarks.

The Order *Pelecaniformes* is characterised by the nature of the feet, the toes being fully webbed, *the hind toe being united to the inner toe by a web*.

The birds are mostly of large size, some very large and few are small: the bill obviously differs in the families, in some being stout, straight and conical, in others long, thin and hooked. In some families the bill has the nostrils obliterated in the adult, in others the nostrils are obvious. The wings are usually long, sometimes very long, while the tail may be long, short or very long, rounded, wedge-shaped or deeply forked. (Memo.—A forked tail never appears among the *Anseriformes*.) Gular pouches are a general feature, though sometimes obsolete, sometimes even absent. They are mostly marine birds, but one family consists of river-dwelling evolutionists, while others sometimes go far inland to breed, though the majority pass the time at sea and breed on isolated islands in congregations. Practically all are gregarious at the breeding-season.

The apparent heterogeneity of such a grouping has constantly attracted thinking systematic workers, and no definite line of evolution has yet been suggested for some of the members. A recent attempt to satisfy queries was made by W. P. Pycraft in *Proc. Zool. Soc. (Lond.)* 1898, pp. 82-101, who concluded: "(1) All are closely related; (2) they cannot be broken up to form one or more suborders or subdivisions of equal value; but that (3) they must be regarded as a whole, as a suborder . . ."

It is quite impossible to accept Pycraft's conclusions upon his own premises, though they may be correct. The chief stumbling-blocks in the Order are *Fregata* and *Phaethon*, and Pycraft does not satisfy the demands of either. Thus he writes: "The most important witness to the integrity of the suborder is the skull. Three types can be easily distinguished. . . . The

PELECANIFORMES.

first of these is the most primitive . . . *Phalacrocorax* and *Plotus* belong to this first type. . . . Our second type is found in the skulls of *Phæthon* and *Pelecanus*, but, beyond this, the two skulls appear to have little else in common. The skull of *Phæthon* appears to be the least specialised of the whole group, and presents characters which are not only found in all, or nearly all the other *Steganopodes*, but which also occur in forms outside this suborder. . . . A vomer occurs only in *Phæthon* and *Fregata*. . . .”

“*Fregata* may be regarded as a link connecting *Phæthon*, which is undoubtedly one of the least specialised and most primitive of the *Steganopodes*, with the *Procellariiformes*.”

I cannot reconcile such statements and consider more study necessary before the exact position of *Phæthon*, especially, can be correctly determined.

However, for the present purpose the *Pelecaniformes* can be recognised as an Order, but further research may make subdivision necessary.

The six families may be shortly diagnosed thus: Family *Phalacrocoracidae* are large birds, but for this Order comparatively small ones, with long thin hooked bills showing nostrils obscurely, medium wings, long neck with gular pouch and medium cuneate tail; tarsus short, but toes long, the outer one longest and the others regularly decreasing in size; all fully webbed.

Family *Anhingidae* are larger birds with long, slender, straight and pointed bills showing obscure nostrils, no gular pouch, very long slender neck with a fixed “kink” in it, long cuneate tail and medium wings, short tarsus and long toes. Phylogenetically this is an evolution product of the former, but is now so well differentiated as to unhesitatingly demand family rank. The distribution of the species is erratic, somewhat agreeing with that of the Tree Ducks in the preceding Order.

Family *Sulidae* are very large birds with long, stout, conical, straight pointed bills, with nostrils closed in the adult state so as not to be seen: neck stout and short with small gular pouch, long wings and long regular wedge-shaped tail, short tarsus and long toes. The metatarsus is stout and strong and comparatively long for the Order. The birds are large and heavy, being very stoutly built.

Family *Fregatidae* are large birds with long, slender, but broadish, hooked bills, nostrils open, long neck, and gular pouches very large and distensible in the breeding male, very long wings and very long deeply-forked tail. The tarsus is so short as to be almost negligible, and the toes long, the connecting webs deeply emarginate.

Though these birds are large they are very slight and the body is comparatively very small. The very long forked tail is characteristic and is not otherwise seen in the Order.

THE BIRDS OF AUSTRALIA.

Family *Phaethonidæ* are large to small (for this Order) birds, with long stout slightly curved but pointed bills with open nostrils, long wings, long tail with middle feathers immensely elongated, generally one and a half times to twice the length of the wing, short tarsus and toes. The toes are all connected with webs, but the form is normal, the middle-toe being longest and the hind one short and placed posteriorly.

The extreme elongation of the tail feathers easily distinguishes this group, while the birds are apparently bulky and the wings comparatively short. Yet they are capable of the most extended flight, being seen further away from land than any other bird, including the preceding much vaunted "King of the Air."

The Family *Pelecanidæ* are very large birds with immensely long depressed broad hooked bills, with huge gular pouch, long wings, short tail evenly rounded, and long (for this Order) legs and feet. The huge pouched bill characterise this family which consists of very large stoutly-built birds with legs stout and large. The bill is more than half the length of the wing and twice the length of the tail.

The preceding sketch shows the diverse elements herewith associated, as nothing could be much more unlike than the large airy *Fregata* and the very large solid *Pelecanus*, while the bills of *Fregata* and *Phaethon* show as much divergence.

It might be observed that in manners these groups show just as much diversity, *Pelecanus* being a dweller on the ground, *Anhinga* being a river swimmer constantly in the water; *Phaethon* and *Fregata* are only at home in the air, being quite helpless on the ground as the extreme shortness of the legs and length of their wings testify, while species of *Phalacrocorax* and *Sula* are only on land for the breeding-season and otherwise live on the sea, though they are splendid flyers. All the Order are practically solely fish-eaters.

Ogilvie-Grant's Family *Phalacrocoracidæ* is subdivided into two sub-families, *Phalacrocoracinæ* and *Plotinæ*, covering two genera only. I consider these as families and would divide the former into several genera though the latter covers one genus only. The genera in the Family *Phalacrocoracidæ* are well marked and easily diagnosed. Genera were proposed by Reichenbach in 1852 and utilised by Bonaparte in 1855. Careful workers such as Salvadori, in the brilliant *Orn. Papuasia*, made use of them, though at that time he did not recognise the genera in the *Anseriformes* that he later approved of when monographing the group.

The publication of the *Catalogue* of the Birds in the British Museum produced, as usual when the worker was retrogressive, a retrograde action, and this is noted in the American Ornithologists' Union *Check-List*, 3rd edition, 1910. Only one genus appears though three subgenera are admitted.

PELECANIFORMES.

The differential characters of the genera will be fully discussed in their place, but the Australian species number five and these are allotted to four genera.

The first, *Phalacrocorax*, is represented throughout the whole of the Old World and on the eastern coast of North America. The Australian representative is simply a subspecies of the single species which thus has such a wide range.

The second genus, *Mesocarbo*, seems to be confined to Australia and New Zealand.

The third genus, *Hypoleucus*, of which two members are found mostly in Southern Australia, although ranging to Queensland, is Subantarctic in distribution, many species occurring at New Zealand, South America, Falkland Islands and Kerguelen Land.

The fourth, *Microcarbo*, though extending to New Zealand, is an immigrant into Australia from the North, though now the commonest member of the family. Its relations are with the South European *M. pygmaeus*, which ranges into Eastern Asia, and *M. javanicus*, which continues from India to Borneo.

The lumping of all these different forms into one genus loses sight of such peculiar distribution as the preceding, which is clearly observed by means of natural genera.

The sole representative of the second family *Anhingidae* is, however, referable to the genus *Anhinga* (*Plotus*) which is divisible into four species, one of which lives in tropical and subtropical America, the second in Africa, the third in Southern Asia and the last practically confined to Australia but occurring in Southern New Guinea. Here no subdivision is practicable, and when such is shown in conjunction with similarly constituted genera the lessons of distribution become well marked.

To the family *Sulidae*, the genus *Sula* of Brisson 1760, and Ogilvie-Grant 1898, four species are referred, each in my opinion referable to a distinct genus.

Again by means of such genera distributional facts of great value are shown.

Thus *Sula* Brisson is typified by the *Pelecanus sula* Linné, and this is a smallish Gannet of white coloration: it is confined to the Tropics and Subtropics ranging throughout the Atlantic, Indian, and Pacific Oceans. So little differentiation can be observed that Ogilvie-Grant considered that only one form was recognisable. Good subspecific characters seem however to exist in the coloration of the "soft parts." The plumage changes also need careful study, but no long series have yet been collected on account of the size

THE BIRDS OF AUSTRALIA.

of the birds and the trouble and time necessary to prepare specimens. In fact, it is only due to the paucity of material that the subspecific forms have not long since been well defined. The tail is very long and composed of fourteen to sixteen feathers.

The second genus, which I call *Sulita*, is that represented by the famous "Gannet with a history," the *Pelecanus bassanus* of Linné. This bird is confined to the North Atlantic, ranging south in winter only as far as the Canary Islands, yet it has a close ally on the south coasts of South Africa which in winter gets as far north as Loango and Zanzibar. Then with another wide hiatus it reappears on the south coasts of Australia and New Zealand in the species known as *Sula serrator*. The close relationship between these forms can be gauged by the fact that at one time I ranked the Australian form as only subspecifically separable from the European one. The difference apparent lies in the coloration of the tail feathers, otherwise the three forms very closely agree. They are all large Gannets of white coloration with comparatively shorter tails, composed of twelve feathers only. The fact that the species differ so little in such widely separated localities as Britain and the Antipodes with no continual connection proves the fixity of the form and it must be regarded as generically distinct; there is a narrow bare patch of skin apparent on the throat and this has been utilised to confirm generic separation, but the facts seem to call for such, even without taking into consideration this detail.

As I shall hereafter show, the covering of the legs and feet differ extremely in this genus from that observed in all the other Suline birds, so that its generic distinction cannot be denied by any save the most careless of workers.

The third genus, *Parasula*, consists of large Gannets, bearing no thin naked throat-strip, having white coloration, and short tail composed of sixteen or eighteen feathers. Known as Masked Gannets, as the bare skin of the face extends behind the eyes, this form is confined to the Tropics, of the Atlantic, Indian and Pacific Oceans, intervening between the Northern and Southern Atlantic species of "Gannet" referred to the genus *Sulita*. As members of both genera are large somewhat similar birds, while one species has only twelve tail-feathers, the other has sixteen to eighteen tail-feathers, the generic distinction must be obvious to any unprejudiced observer. Prejudice, however, has been allowed to bias the judgment of most past and present British ornithologists. This is easily seen by Ogilvie-Grant's treatment of the type species of *Parasula* when he wrote: "Judging from the descriptions published by various authors, the colours of the soft parts vary greatly. . . . Too much importance must not, however, be attached to these differences." If he had only studied these differences

PELECANIFORMES.

instead of ignoring them he might have been able to indicate the subspecies, but such things did not exist according to his ideas and consequently did not exist in nature.

The fourth genus, *Hemisula*, stands quite alone in its coloration, being, instead of the usual white, dark sooty-brown above, with the neck and chest also of that colour, the breast and under-parts only being white. In a group where the fixity of coloration is proven to be a very ancient item, such vivid alteration would alone call for generic recognition. The birds are, however, small Gannets with comparatively shorter tail as compared with the other Gannets, and fourteen tail-feathers, the same as in those.

It is a tropical genus, practically coincident with the other small white Gannet but apparently with very different habits. Phylogenetically this appears to be the nearest relation, but a great deal of difference now exists. No subspecies were recognised, as usual, by Ogilvie-Grant, but that does not mean that such were non-existent, nor easily recognisable.

The Family *Fregatidæ* has only one genus, *Fregata*, which ranges throughout the Tropics in all oceans. Four species are now known, though only two were on record when I begun my investigations. These are fully dealt with later, so can be shortly dismissed here, but their distribution and plumage changes call for comment and much study and I hope my contribution will induce other and probably better situated workers to take an interest in this group.

The Family *Phæthontidæ* is represented by the single genus *Phæthon* in the *Catalogue* of the Birds of the British Museum, in the same manner as the Brissonian *Sula* was employed. The half dozen species there recognised represent, in my opinion, different generic types, and the two species which come into the Australian Avifauna do not come into the restricted genus *Phæthon*.

The genus *Scæophaëthon* covers large Tropic Birds of white coloration with long tail of sixteen feathers, the two middle ones being immensely elongated; the young are beautifully mottled black and white.

The members of the genus *Leptophaëthon* are small Tropic Birds of uniform coloration—white in two species, a beautiful orange in the third, with comparatively a longer tail of only twelve feathers: the young are mottled black and white as in the preceding genus.

The members of both these genera range throughout the Tropics of all the oceans.

The genus *Phæthon* as restricted covers species which never take on the beautiful white coloration but retain in the adult the barred plumage observed in the juvenile of the preceding genera. While the tail is very long,

THE BIRDS OF AUSTRALIA.

it is composed of fourteen feathers. Phylogenetically this would represent the oldest form, the aforementioned genera showing specialisation in two extreme ways.

The last Family, *Pelecanidæ*, again utilised generically by Ogilvie-Grant in a Brissonian manner, though Brisson named it *Onocrotalus*, not *Pelecanus*, must be divided into several genera. The single Australian species is very well differentiated, being one of the largest Pelecans known, agreeing in size with the typical member of the genus *Pelecanus*, but separated from every other Pelecan by the feathered lores. Inasmuch as Pelecans vary in size and coloration immensely in various parts of the world and are a very ancient form, this apparently small item becomes a very important character when these birds are considered from a phylogenetic standpoint.

This Order, then, shows a great deal of peculiarity in manner and is worthy of the closest study in every way; series, showing plumage evolution, are desirable and also series showing structural evolution should be studied.

GENUS—P H A L A C R O C O R A X .

- PHALACROCORAX Brisson, Ornith., Vol. VI., p. 511, 1760 .. Type *P. carbo.*
Carbo Lacepède, Tableau Oiseaux, p. 15, 1799 Type *P. carbo.*
 (Daudin 1802, Vol. XIV., p. 318.)
Halieus Illiger, Prodrum, p. 279, 1811 Type *P. carbo.*
Carbonarius Rafinesque, Analyse de la Nature, p. 72, 1815 Type *P. carbo.*
 (Auk, Vol. XXVI., p. 50.)
Hydrocorax Vieillot, Analyse nouv. Ornith., p. 63, 1816 (not
Hydrocorax Brisson, 1760) Type *P. carbo.*
Graucalus Gray, List Genera Birds, 2nd ed., p. 101, 1841
 (not Cuvier, 1816) Type *P. carbo.*
 Also spelt—
Graculus Gray, Genera Birds, Vol. III., p. 667, 1845.
Cormoranus Baillon, Mem. Soc. Roy. Abbev., p. 76, 1833 .. Type *P. carbo.*
Ecmeles Gistel, Naturg. des Thier. Schul., p. ix., 1848 .. Type *P. carbo.*

LARGE Phalacrocoracine birds with long hooked bills, long neck, long wings, medium tail, short legs and long toes, all the toes, including the hind one, connected with a web.

The bill is long and slender, with culmen depressed, and a very sharp, prominent hook. The culmen is separated from the lateral portions by a narrow groove in which the nostrils, obsolete and scarcely apparent in the adult, are placed at about a quarter the bill's length from the frontal feathering. The bill is longer than the head and about equal to the metatarsus in length. The under mandible is narrow, the rami enclosing a very narrow unfeathered tract, which develops into a more or less distensible gular pouch.

The head is crested and the lores are bare.

The wings are long with the second primary longest, the third a little shorter, almost subequal, while the first is longer than the fourth though shorter than the third; all the primaries show scalloping.

The tail is comparatively short, less than half the length of the wing and about twice the length of the culmen or metatarsus. It is wedge-shaped, composed of fourteen very stiff feathers with short, insignificant upper tail-coverts.

THE BIRDS OF AUSTRALIA.

The legs are short, the toes long. The metatarsus is very stout, laterally compressed, reticulated throughout, the scales on the front and sides small but those on the hind portion very minute. The metatarsus is about half the length of the tail and two-thirds the length of the outer toe.

The toes are all fully connected with a web, the outer toe longest, the middle longer than the inner, the inner exceeding the hind toe. The claws are long, hooked, the middle one bearing pectinations.

The preceding description applies generally to members of this family, which Ogilvie-Grant included in one genus. The genera which I admit vary in wing-formula, proportions of wing to tail, culmen, etc., and size.

The succeeding generic diagnoses will be based upon this one, comparative points being given as tending to more exactitude.

Reichenbach, in his *Nat. Syst. Vögel.*, p. vii., 1852, indicated the first subdivision of *Phalacrocorax*, his genera reading—

<i>Halieus</i> Ill.	Type	<i>H. pygmæus</i> L. Gm.
<i>Hypoleucus</i> Rchb.	„	<i>H. varius</i> L. Gm.
<i>Phalacrocorax</i> Gesn.	„	<i>P. carbo</i> Linn.
<i>Graculus</i> L.	„	<i>G. cristatus</i> Faber, Gray.

Bonaparte, in the *Comptes Rendus Sci.* (Paris), Vol. XLI., p. 1114-5, 1855, recognised Reichenbach's genera and added another, *Stictocarbo*, for *punctatus* and *gaimardi*.

The same year Gray in his *Cat. Gen. Subgen. Birds*, p. 133, allowed Reichenbach's four divisions, but used—

<i>Graculus</i> Linn, 1735	<i>P. carbo</i> Linn.
———— ? <i>Graculus</i> Rchb., 1853	<i>P. cristatus</i> Faber.
<i>Hypoleucus</i> Rchb., 1853	<i>P. varius</i> Gmel.
———— ? <i>Halieus</i> Rchb., 1853, not Illiger, 1811.	<i>P. pygmæus</i> Pall.

In the synonymy of *Graculus* he quoted *Gulosus* Mont., 1813, but this was proposed for *P. cristatus* Faber, and should have been used for his section division, the *Graculus* Rchb., 1853, not Linn. *Graculus* is of course untenable, as it was not used in 1758 in this sense. In 1856 the part of the *Consp. Gen. Av.*, Vol. II., dealing with these birds by Bonaparte appeared, and there we find *Phalacrocorax* (p. 167), *Graculus* (p. 170), *Hypoleucus* (p. 173), *Sticticarbo* (p. 174), *Urile* (p. 175), and *Halæus* (p. 177).

With regard to *Sticticarbo* two species are still named, *gaimardi* and *punctatus*; of the former Bonaparte himself writes, "Species aberrans" and of the latter "Species typica." From this and the name formation the only possible type selection was *punctatus*, which was made by Salvadori in 1882, and Ogilvie-Grant erred in writing *gaimardi* in the *Catalogue* of the Birds in

PHALACROCORAX.

the British Museum, Vol. XXVI., p. 331, 1898, as being the type in this place while correctly citing the species *punctatus* as type of the earlier introduction. Under his new genus *Urile* Bonaparte noted two sections, *Urile* and *Leucocarbo*, while after "*Haliaeetus* Bp. ex Ill.," he noted "*(Microcarbo si videbitur)*." Corrections to this—probably at that time unpublished—classification were made by Bonaparte in the *Comptes Rendus Sci.* (Paris), Vol. XLIII., September, 1856, where *Urile* is noted with *P. urile* as type; *Sticticarbo* is dismissed, as *S. gaimardi* should be referred to *Graculus*, while *S. punctatus* would fall into *Urile*. He further raises *Leucocarbo* to generic rank for the American species of *Hypoleucus*, classing it near *Urile*. On p. 577, *Microcarbo* is fully proposed for *Haliaeetus* Rehb. nec Ill., and *P. pygmaeus* is definitely named as type. Here again this is not the type given by Ogilvie-Grant in the *Catalogue* of the Birds in the British Museum, Vol. XXVI., p. 331, 1898, where *P. melanoleucus* is named.

Bonaparte's dismissal of *Sticticarbo* cannot be recognised, as that would accurately mean the replacement of *Urile* by that name.

Salvadori in the *Ornith. Papua. e Mol.*, Vol. III., 1882, generically used *Microcarbo* and *Hypoleucus*, but in the former he placed *C. sulcirostris* Brandt. This species is separated at sight from typical *Microcarbo* by its short tail, and many other minor differences exist.

Since Ogilvie-Grant's retrograde treatment of this group in the *Catalogue* of the Birds in the British Museum, Vol. XXVI., 1898, no interest has been evinced with regard to its systematic classification, though in the American Ornithological Union's *Checklist*, 3rd ed., 1910, under the genus name *Phalacrocorax*, three subgenera are admitted.

PHALACROCORAX CARBO NOVÆHOLLANDIÆ.

BLACK CORMORANT.

(PLATE 219.)*

PHALACROCORAX NOVÆHOLLANDIÆ Stephens, in Shaw's Gen. Zool., Vol. XIII., p. 93, 1826; Tasmania.

New Holland Shag, Latham, Gen. Hist. Birds, Vol. X., p. 431, 1824.

Phalacrocorax novæhollandiæ Stephens, in Shaw's Gen. Zool., Vol. XIII., p. 93, 1826; Bonaparte, Consp. Gen. Av., Vol. II., p. 169, 1856; Gould, Handb. Birds Austr., Vol. II., p. 488, 1865; Ramsay, Ibis 1866, p. 335; *id.*, Proc. Zool. Soc. (Lond.) 1877, p. 348; A. G. Campbell, Emu, Vol. II., p. 18, 1902; Batey, *ib.*, Vol. VII., p. 17, 1907.

Phalacrocorax carboides Gould, Synops. Birds Austr., pt. iv., App., p. 7, 1838 (Tasmania); *id.*, Proc. Zool. Soc. (Lond.) 1837, p. 156, 1838; Fraser, *ib.*, 1839, p. 114; Gray, List Birds Brit. Mus., pt. iii., p. 184, 1844; Gould, Birds Austr., Vol. VII., pl. 66, 1848; Macgillivray, Narr. Voy. "Rattlesnake," Vol. II., App., p. 359, 1852; Müller, Proc. Zool. Soc. (Lond.) 1869, p. 280; Gray, Handl. Gen. Sp. Birds, pt. iii., p. 127, 1871; Witmer Stone, Austral Av. Rec., Vol. I., p. 144, 1913.

Graculus novæhollandiæ Gray, Genera Birds, Vol. III., p. 667, 1845; Ramsay, Proc. Linn. Soc. N.S.W., Vol. II., p. 203, 1877; *id.*, Tab. List Austr. Birds, p. 24, 1888; North, Austr. Mus. Cat., no. 12, p. 365, 1890.

Graculus carboides Reichenbach, Synops. Av. Nat., pl. 64, figs. 2549-50, 1850.

Phalacrocorax carbo Legge, Papers Proc. Roy. Soc. Tasm., 1886, p. 244, 1887; Ogilvie-Grant, Cat. Birds Brit. Mus., Vol. XXVI., p. 340, 1898; Hall, Key Birds Austr., p. 101, 1899; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 971, 1901; Milligan, Emu, Vol. II., p. 76, 1902; Hill, *ib.*, p. 167, 1903; Campbell, *ib.*, Vol. II., p. 209, 1903; Hill, *ib.*, Vol. III., p. 229, 1904; Legge, *ib.*, Vol. IV., p. 105, 1905; Le Souëf, *ib.*, p. 138; Nicholls, *ib.*, Vol. V., p. 82, 1905; Campbell, *ib.*, p. 145, 1906; Hall, Key Birds Austr., p. 101, 1906; Austin, Emu, Vol. VII., p. 78, 1907; Mathews, Handl. Birds Austral., p. 37, 1908; Mellor, Emu, Vol. VII., p. 186, 1908; Mattingley, *ib.*, Vol. VIII., p. 20, 1908; Hill, *ib.*, pp. 222-223, 1909; Howe, *ib.*, Vol. IX., p. 229, 1910; Littler, Handb. Birds Tasm., p. 197, 1910; Ingle, Emu, Vol. X., p. 127, 1910; Hull, *ib.*, p. 257, 1911; Stone, *ib.*, Vol. XII., p. 120, 1912; Hill, *ib.*, p. 254, 1913; Agnew, *ib.*, Vol. XIII., p. 94, 1913; North, Aust. Mus. Spec. Cat., no. 1, Vol. III., p. 320, 1913; Macgillivray, Emu, Vol. XIII., p. 147, 1914; Barnard, *ib.*, Vol. XIV., p. 41, 1914.

* The Plate is lettered *Carbo novæhollandiæ*.



H. Grönvold, del.

Witherby & Co

$\frac{1}{4}$
CARBO NOVÆ-HOLLANDIÆ.
(AUSTRALIAN BLACK CORMORANT)

BLACK CORMORANT.

Carbo carbo novæhollandiæ Mathews, Nov. Zool., Vol. XVIII., p. 240, 1912.

Carbo carbo westralis Mathews, Austral Av. Rec., Vol. I., p. 33, 1912: Swan River, West Australia;

Phalacrocorax carbo novæhollandiæ Mathews, List Birds Austr., p. 95, 1913.

DISTRIBUTION. Australia; Tasmania.

Adult male (in winter). Upper-back, scapulars, and wings greyish-brown with black margins to the feathers; lower back, rump, and upper tail-coverts uniform blue-black; quills and tail-feathers dull black with very glossy shafts; head and neck all round and the entire under-surface glossy black with green reflections in certain lights; chin and sides of the face, including the eye, white; a few white feathers on the lower flanks. Bill yellow, culmen purplish, naked skin gamboge-yellow; iris emerald-green; feet black. Total length 780 mm.; culmen 67, wing 357, tail 155, tarsus 60.

Adult female. Similar to the adult male but smaller. In summer the adults have a white patch on the flanks and white lanceolate feathers on the neck.

Immature. Distinguished by its browner appearance, especially on the head, neck, and under-parts, the absence of the white flank plumes, and in being whitish in the middle of the belly.

Nest. Composed of twigs, etc., saucer-shaped, about three inches deep and 16 to 18 inches wide, placed (often in colonies) in low bushes or rocky ground.

Eggs. Four (sometimes three); ground-colour greenish and dull, covered with a white coating of lime. Axis 59-60 mm.; diameter 35-6.

Breeding-season. August to November (Campbell).

THIS well-known bird was first described in the *General History of Birds*, Vol. X., p. 431, 1824, by Latham as: "New Holland Shag. Length twenty inches. Bill two inches and a half long, and pale; round the eye bare and pale yellow; plumage on the upper-part in general black; the feathers on the wing-coverts have pale edges, and those of the neck fringed with rufous; under-parts paler and mottled; tail six inches long, composed of twelve feathers, cuneiform; legs black. Inhabits New Holland. In some things this corresponds with the African species, but is probably distinct."

To this description two years later Stephens gave the Latin name *Phalacrocorax novæhollandiæ*.

Twelve years later Gould named the Australian bird *Phalacrocorax carboides*. In the *Handbook* he accepted Stephens' name which displaces his own given later. His remarks: "Its habits, manners and mode of life are so precisely similar to those of the Common Cormorant of Europe, that a description of them would be superfluous: its chief food as a matter of course consists of fish," seem to have prejudiced every observer so that nothing much is known regarding the life-history of this bird.

The only note I have received is from Mr. J. W. Mellor, who states: "This is not so plentiful as the other species, but can by no means be called rare, especially in the early days, although since the vigorous war waged

THE BIRDS OF AUSTRALIA.

against all Cormorants during the past few years, this species seems to be getting scarce as far as South Australia is concerned. The destruction of the Cormorant or 'Shag,' as it is often known, is a great shame, carried out under the mistaken idea that it is an enemy to mankind, by eating all the fish up, but from my experience and observations the Cormorant is one of Nature's 'teeth' in the 'cogwheel' of her evenly-balanced machinery; destroy one of the 'teeth' and the machinery will go wrong. In our gulfs and about the isolated islands on the coast I have noted that fish were more plentiful just where the Cormorant rookeries were situated; some would argue 'of course, quite natural' for 'where the carrion is, there you will also find the vulture,' the inference being that the Cormorant was there to eat up the fish, but strange to say the Cormorants were there when white man first came, and were there for aught we know ages previously and the fish were always plentiful, but directly the birds were destroyed, the fish gave out, which is a natural consequence, as the Cormorants live to a large extent on the enemies of the fish, such as squid, crustaceans and other predatory agents of the finny tribe. It is a pity that the people do not study the life habits of the birds, etc., more than they do instead of judging from appearances. The Cormorant will catch fish, but more often than not it overtakes and eats those that are weakly and physically unfit for reproduction; this is feasible, as the healthy vigorous fish is more able to take care of itself in the water than the Cormorant is to catch it. The result is that the birds in eating up the weaklings carry out the survival of the fittest, and the breed is kept healthy and strong throughout the ages. I have seen the large Black Cormorant in many localities in Australia, but its main habitat is the sea coast and the many reefs and islands found in these localities. I have seen many of the birds about the mouth of the Port Adelaide River, but it is practically *non est* there now. I have also seen these birds at the Murray mouth and on Lakes Alexandrina and Albert in South Australia; they are unmistakable from any other members of the family on account of their great size and jet black coloration, *there being occasionally a little speckling of whitish feathers on the neck*, which is not seen at a distance. I have seen them at the Reed-beds in South Australia but at no great distance from the sea-coast. On the Coorong a few of these were seen, but they were extremely wild and wary, and we could not get within easy reach of them: they were generally seen in the water, or flying past well out of harm's way; in the water they often go in companies of twenty or more, diving and swimming about with great ease. I noted where they had built their nests in previous years on an island, there being plenty of old nests about on the low bushes and on the rocky ground, some

BLACK CORMORANT.

being placed quite close together, while others were isolated, but sorry to relate, there was ample evidence of where the 'headhunters' had decapitated the young birds in previous years, accounting for the extreme wariness of the old birds that we saw; there were also plenty of egg shells about, where the hunters had smashed them up in the nest and on the ground. As these birds and the other members of the family eat quantities of crustaceans, small crab, etc., besides a few fish, now that the fishermen have killed out these birds to a minimum they are being rewarded for their trouble by a terrible increase of small crabs in the Coorong waters, to the extent that when they set their nets, instead of fish, they now get them full of these crabs which eat the strands, and also eat any fish that get meshed, and of course the crabs eat up the spawn of the fish so that fish are now scarce, just a natural consequence of carelessly interfering with Nature."

The bird figured and described is a male collected at Gracemere, Queensland, on the 9th of March, 1881, and is the type of *P. c. gracemeri*.

As already indicated, the treatment of this group in the *Catalogue* of the Birds in the British Museum, Vol. XXVI., 1898, was, as regards generic forms, retrogressive in the extreme, so as regards species and subspecies it was not only unprogressive but unintelligible with respect to this species.

On p. 340 *Phalacrocorax carbo* is catalogued, and on p. 347 its range is given as "The Atlantic coast of North America from Hudson's Bay to Georgia; South Greenland, Iceland, Faroes, thence across Europe and Asia to Kamtschatka; southwards to the Cape of Good Hope and from the Mediterranean to the Malay Peninsula, Australia, New Zealand, and Chatham Islands."

On p. 350 *Phalacrocorax filamentosus* is admitted, the range reading: "The coast of North-east Asia, from East Siberia to Amoy, S. China; Japan."

This suggests at once that two very distinct species are here noted, and Ogilvie-Grant remarks: "This species is most nearly allied to *P. carbo*, but may be distinguished *at all ages* by the shape of the bare space on the throat; in the present species the feathering extends forward beyond a line drawn at right angles to the commissure of the gape, while in *P. carbo* the feathering does not extend nearly to this line (see figs. 1 and 2, p. 340)."

Why such an extraordinarily variable feature as the neck feathering in this species was taken into account I am unable to imagine, as the specimens catalogued by Ogilvie-Grant under *P. carbo* have commonly the form figured for *P. filamentosus*.

THE BIRDS OF AUSTRALIA.

A further character of *P. filamentosus* noted is "the oil-green colour of the under-parts." Specimens from Australia and New Zealand have this same oil-green under-surface coloration, but this was ignored and the birds catalogued under *P. carbo*.

A third feature of "the adult" of *P. filamentosus* was given as "the mottled feathers bordering the throat." It will be observed that twenty specimens are recorded under that name, but of this number only *three* are recognised as adult. Under *P. carbo*, nine examples from China and Japan are placed and *three* of these are marked adult.

In the *Naturalists' Miscellany*, Vol. XIII., pl. 529, 1802, Shaw and Nodder described *Pelecanus sinensis*. The figure given is of a brown bird with white throat and white breast marked with brown spots or splashes. Many of the immature specimens named by Ogilvie-Grant as *P. filamentosus* agree very closely with this figure and Shaw's name should be utilised in preference to Ogilvie-Grant's choice. Apparently the only reason why it was rejected was because the plate did not show the throat-feathering according to Ogilvie-Grant's determination. As the plate was drawn about a hundred years before, when such details were not considered, that was no just cause for dismissal. When Ogilvie-Grant's separative character is proved absolutely valueless, Shaw and Nodder's name must be used. It is as certainly applicable as the name chosen. A curious action on Ogilvie-Grant's part noticeably throughout the *Catalogue* was the upsetting of any established name on any pretext whatever; in the case of *Phaethon* he out-heroded Herod in his recognition of the Law of Priority, while here he selected *P. filamentosus*, though the bird had been known for thirty years, without a dissentient, as *P. capillatus*. The former was given in the text, the latter on the plate in the same work, *but the plates were published before the text and therefore had priority, according to Temminck himself*.

A complication would be introduced were two birds so nearly allied to each other as Grant's *P. carbo* and his *P. filamentosus* living together in China and Japan. I cannot see any differences save the mottled throat, and this I conclude is seasonal or juvenile.

All the immature in brown plumage have white throats, while the three specimens catalogued by Ogilvie-Grant as adult *P. filamentosus* have the throat mottled with dark feathers. These also show "filamentous" white feathers on the sides of the necks; the dates are February and April. The bills in these birds are of the flaky surface appearance associated with young birds. Other birds from China have no dates, but have fully adult bills and heavy white neck feathering associated with *P. carbo*.

BLACK CORMORANT.

An April bird procured in India shows the same kind of "filamentous" feathering on the neck, and it seems certain that this is seasonal and probably juvenile. I conclude that only one form of *P. carbo* is found in China and Japan, and that "*P. filamentosus* Ogilvie-Grant" is non-existent as a species. To revert to *P. carbo* recognised by Ogilvie-Grant; his remarks read: "Birds from the Faroe Islands, Great Britain, etc., are distinctly larger than those from India, etc., the bill being, as a rule, conspicuously larger and stouter. No great importance need, however, be attached to this difference, for the largest Indian specimens are not appreciably smaller than some of the birds from northern latitudes." Then follows a table giving measurements of specimens which show that Indian birds are relatively smaller throughout than European specimens. No difference in coloration is given by Ogilvie-Grant, though such is apparent when series are criticized.

Ogilvie-Grant's description of the coloration of *P. carbo* reads: "General colour black, glossed with dull purplish or bluish oil-green."

The birds from the Faroe Islands, as well as being very large are of the deepest purplish gloss throughout. Northern Scotch birds agree closely and British birds are very similar in the depth of the gloss. A specimen from the South Danube is still purplish, but a little paler with a tinge of blue throughout. Indian birds show a coloration which is better described as bluish-green with a slight purplish tinge. The Chinese and Japanese birds show, as described by Ogilvie-Grant, a deep oily-green coloration, but some show a purplish tinge. Australian and Neozelanic specimens are also deep oily-green, purplish-blue being only observed in rare instances.

The breeding-plumage of the British birds, according to Ogilvie-Grant, "is generally assumed by the end of February and lasts till the beginning of April." This agrees with the specimens under consideration. This nuptial plumage consists of white feathering on the head, neck and flanks, described by Ogilvie-Grant thus: "Top of the head and greater part of the neck covered with long, narrow, white feathers which often hide the shorter black plumage beneath and give these parts a nearly white appearance: a large patch of white feathers on each flank." Such a description is not applicable to the Australian bird which Ogilvie-Grant confused under the name *P. carbo*, as he also adds: "The white flank-patches are retained till the middle of June and do not disappear till the end of July."

Though Gould and Buller had clearly stated the differences between the Australian and New Zealand birds and the European one, and *though these differences were obvious* in the specimens he examined, Ogilvie-Grant ignored them, yet recognised *P. filamentosus* on characters of no value, as seen in his own series. Yet such action has been accepted by systematists because it

THE BIRDS OF AUSTRALIA.

was published in the *Catalogue* of the Birds in the British Museum. I have before intimated how that publication has been allowed to prejudice the better judgment of American ornithologists, and here is another extraordinary instance. Ogilvie-Grant included North America in his range, and all American references were included under *P. carbo*, but he does not catalogue a single American specimen.

Yet, without comment, *P. carbo*, without any subspecies indicated, is included in the American Ornithological Union's *Checklist*, 3rd ed., 1910, the range given being the same as that prepared by Ogilvie-Grant. Yet on the same page (p. 62) *Phalacrocorax auritus* (Lesson), an endemic North American bird, is divided into four subspecies. Re-consideration of *P. carbo* is indicated, especially as Reichenbach and Bonaparte both separated and named the North American bird.

Probably many subspecies are separable when long series are available, but owing to its common occurrence such are not generally collected.

As to the Australian form, it has been noted and described by nearly every Australian writer since Gould's time as distinct, the green coloration of the under-surface, etc., being clearly written. Thus Gould writes: "deep, glossy, blackish-green," and Hall, though basing his diagnoses on the *Catalogue of Birds*, was compelled to state: "glossed with dull green."

Buller, in the *History of Birds New Zealand*, p. 325, 1873, recognised the New Zealand bird as distinct from the European one, giving as coloration "shining greenish-black," and wrote: "In summer the male is adorned with numerous white linear feathers, scattered over the throat and neck, and extending about half an inch beyond the permanent feathers; but these white plumes never assume the dense character exhibited in the summer plumage of *P. carbo*, in which these parts, as well as the crown, appear almost entirely white." In the *Supplement*, 1906, he still maintained this opinion in spite of Ogilvie-Grant's "lumping."

In general characters the Neozelanic bird agrees with the Australian and was separated by Iredale and myself in the *Ibis*, 1913, p. 411, as *Carbo carbo steadi*. The Australian form, then, differs appreciably from the European in coloration; further in the nuptial ornamentation, the neck feathering is never as dense as in the latter, and does not appear on the top of the head and is only worn for a very short time: the white flank patch is very much smaller in the Australian form and disappears quickly so that very rarely is it observed at all; in many specimens it is gone before the neck feathering, while in European birds it lasts much longer, as noted by Ogilvie-Grant.

The Indian birds are somewhat intermediate, as they show a purplish tinge through the green, and this in conjunction with their smaller size

BLACK CORMORANT.

demands their recognition as a subspecific form. Study of the plumage changes may produce facts showing that these differ in different localities, as I consider "*P. filamentosus* Grant" is a form confined to China and Japan. I should sketch the subspecies as follows, and ask for investigation of the extra-Australian forms—

Phalacrocorax carbo carbo Linné; Europe.

The type-locality is Sweden and this name may be applied to European and north African examples. Many synonyms abound, and it may be that valid subspecies exist in the congregation here covered by this name, and that some of these synonyms may come into use.

This form is characterised by large size, deep purplish gloss, heavy nuptial ornamentation carried for a long time.

Phalacrocorax carbo americanus Reichenbach; North America.

Graculus americanus Reichenb., *Natat. Synops. Av.*, pl. xxxv^e., figs. 2746-9, 1850, seems applicable, while as a synonym would be quoted—

Phalacrocorax carbo, var. *macrorhynchus* Bonaparte, *Consp. Gen. Av.*, Vol. II., p. 169, 1856.

This name does not appear in Ogilvie-Grant's synonymy. Bonaparte's diagnosis reads: "Major; rostro robustissimo," while I note Ridgway's description of the coloration is "glossy blue-black." This does not apply to British and Faroe Island specimens.

Phalacrocorax carbo indicus, subsp. n.; India.

Although there are synonyms given in the *Catalogue* of the Birds in the British Museum, Vol. XXVI., p. 343, as follows, none is available—

Graculus albiventris Tickell, *J. As. Soc. Beng.*, Vol. XI., p. 463, 1842.

Carbo leucocephala Hodgk., in *Gray's Zool. Misc.*, p. 86, 1844.

Carbo raptensis, *id.*, *ib.*

The first-mentioned was published by Blyth at the place quoted as *Carbo albiventer* Tickell, from Chyebassa, India. This name is pre-occupied by Lesson, *Traite d'Orn.*, p. 604, 1831.

The other two names are *nomina nuda*.

Blyth apparently also described this bird as *P. leucotis*, but that name was also used previously by Lesson at the same place.

This form is characterised by its small size and purplish-green coloration, as noted previously.

Phalacrocorax carbo sinensis Shaw and Nodder; China and Japan.

As synonyms should be noted *Carbo capillatus* and *Carbo filamentosus* Temminck and Schlegel, *Fauna Japonica Aves*, pls. 83 and 83B and p. 129, 1850.

This form is differentiated by its small size and generally oily-green coloration. It would appear to carry the immature plumage a long time

THE BIRDS OF AUSTRALIA.

and to show a mottled neck-patch when changing into fully adult plumage, when the under-surface also shows a purplish tinge for a very short time. The "filamentous" stage is also probably due to this state, and would agree with what Ogilvie-Grant has described as "Immature in the plumage of the third year" for *P. carbo* (p. 346).

Phalacrocorax carbo novæhollandiæ Stephens; Australia.

This form is characterised by its deep oily-green coloration associated with sparse nuptial ornaments, which are rarely observed, due to their evanescent nature.

Phalacrocorax carbo steadi Mathews and Iredale; New Zealand.

This form agrees with the preceding in general features, but is smaller. This classification can only be considered of a temporary nature, but it is certain that future investigation will follow on the lines here indicated. The ranges are not at all defined, due to scant material and the seasonal plumage changes which this bird undergoes. Thus specimens from many localities are not adult or in summer plumage and cannot be accurately compared.

GENUS—MESOCARBO.

MESOCARBO Mathews and Iredale, Ibis 1913, p. 415 .. Type *M. ater*.

SMALL Phalacrocoracine birds with comparatively short, slender bills, rather short necks, long wings, and medium tail *composed of twelve feathers*.

The bill is more delicately formed than in the preceding genus, but on exactly the same pattern.

The tail is about three times the length of the culmen or metatarsus, which are subequal, and more than half the wing length.

When Iredale and I separated this form (*loc. cit.*) we wrote: "The species of *Mesocarbo* differ from those of *Hypoleucus* in their shorter and more slender bills, their longer tails and more slender build: from those of *Microcarbo* in their longer and proportionately more slender bills as well as their proportionately shorter tails."

All these genera agree in having twelve tail-feathers, whereas *Phalacrocorax* has fourteen. The taxonomic value of this difference is uncertain, as the only recent systematist to study the group as a whole placed no value upon any of the characters used by himself in determining genera in other groups, and his species, subspecies, and genera have little interest to any worker save himself. This is unfortunate, as each worker cannot undertake a monographic review of a family such as this one to exactly determine the few forms he has personally to deal with.

MESOCARBO ATER ATER.

LITTLE BLACK CORMORANT.

(PLATE 220.)*

CARBO ATER Lesson, Traité d'Orn., p. 604, 1831 ; Sharks Bay, West Australia.

Carbo ater Lesson, Traité d'Orn., p. 604, 1831 ; Pucheran, Rev. Mag. Zool. 1850, p. 627.

Carbo sulcirostris Brandt, Bull. Acad. Sci. St. Petersb., Vol. III., p. 56. 1837 ; New South Wales.

Phalacrocorax sulcirostris Gray, List Birds Brit. Mus., pt. III., p. 185, 1844 ; Gould, Birds Austr., Vol. VII., pl. 67, 1848 ; Müller, Proc. Zool. Soc. (Lond.), 1869, p. 280 ; Diggles, Birds Austr., Vol. II., pl. 120, 1877 ; Ogilvie-Grant, Cat. Birds Brit. Mus., Vol. XXVI., p. 376, 1898 ; Hall, Key Birds Austr., p. 101, 1899 ; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 972, 1901 ; Hall, Emu, Vol. II., p. 68, 1902 ; Le Souëf, *ib.*, p. 158, 1903 ; Hill, *ib.*, p. 167, 1903 ; Carter, *ib.*, Vol. III., p. 211, 1904 ; Le Souëf, *ib.*, Vol. IV., p. 138, 1905 ; Hartert, Nov. Zool., Vol. XII., p. 206, 1905 ; Hall, Key Birds Austr., 2nd ed., p. 101, 1906 ; Berney, Emu, Vol. VI., p. 155, 1907 ; Ingram, Ibis 1907, p. 396 ; Mathews, Handl. Birds Austral., p. 37, 1908 ; Mellor, Emu, Vol. VII., p. 186, 1908 ; Mattingley, *ib.*, Vol. VIII., pp. 20, 21, 1908 ; Cole, *ib.*, pp. 76, 77, 1908 ; Whitlock, *ib.*, p. 194, 1909 ; Hill, *ib.*, p. 223, 1909 ; Mathews, *ib.*, Vol. IX., p. 239, 1910 ; Ogilvie-Grant, Ibis 1910, p. 173 ; Hull, Proc. Linn. Soc. N.S.W., 1909, Vol. XXXIV., p. 668, 1910 ; Littler, Handb. Birds Tasm., p. 198, 1910 ; Mathews, Emu, Vol. X., p. 107, 1910 ; Crossman, *ib.*, p. 111, 1910 ; Hill, *ib.*, p. 265, 1911 ; Barnard, *ib.*, Vol. XI., p. 20, 1911 ; Stone, *ib.*, Vol. XII., p. 120, 1912 ; Hill, *ib.*, p. 254, 1913 ; Orton and Sandland, *ib.*, Vol. XIII., p. 76, 1913 ; North, Austr. Mus. Spec. Cat., no. 1, Vol. III., p. 326, 1912 ; White, Emu, Vol. XIII., p. 124, 1914 ; Macgillivray, *ib.*, p. 147, 1914.

Graculus sulcirostris Gray, Genera Birds, Vol. III., p. 667, 1845 ; Reichenbach, Synops. Av. Nat., pl. 64, f. 2547-8, 1850 ; Gray, Handl. Gen. Sp. Birds, pt. III., p. 129, 1871 ; Pelzeln, Ibis 1873, p. 124 ; North, Rec. Austr. Mus., Vol. II., p. 38, 1892.

Microcarbo stictocephalus Bonaparte, Consp. Gen. Av., Vol. II., p. 178, 1856 ; New South Wales.

Halæus stictocephalus Bonaparte, *ib.*

Graculus stictocephalus Gray, Ibis 1862, p. 252 ; *id.*, Handl. Gen. Sp. Birds, pt. III., p. 129, 1871 ; Ramsay, Proc. Linn. Soc. N.S.W., Vol. II., p. 203, 1877 ; *id.*, Tab. List Austr. Birds, p. 25, 1888 ; North, Austr. Mus. Cat., no. 12, p. 367, 1890.

* The Plate is lettered *Carbo sulcirostris*.



H. Grönvold, del.

Witherby & Co.

$\frac{2}{5}$

CARBO SULCIROSTRIS.
(LITTLE BLACK CORMORANT).

LITTLE BLACK CORMORANT.

Phalacrocorax stictocephalus Gould, Handb. Birds Austr., Vol. II., p. 495, 1865; Ramsay, Ibis 1866, p. 335; *id.*, Proc. Zool. Soc. (Lond.) 1877, p. 348; A. G. Campbell, Emu, Vol. II., p. 18, 1902; Batey, *ib.*, Vol. VII., p. 17, 1907.

Carbo squamatus Pelzeln, Ibis 1873, p. 124: nomen nudum.

Microcarbo sulcirostris Salvadori, Ucc. Borneo, p. 365, 1874: *id.*, Ornith. Papua. e Moll., Vol. III., p. 408, 1882.

Carbo sulcirostris sulcirostris Mathews, Nov. Zool., Vol. XVIII., p. 240, 1912.

Carbo ater sulcirostris Mathews, Austral Av. Rec., Vol. I., p. 87, 1912.

Carbo ater ater Mathews, *ib.*

Mesocarbo ater ater Mathews, List Birds Austr., p. 95, 1913.

DISTRIBUTION: Australia; Tasmania.

Adult male. Upper-back, sides of breast, scapulars and wings hoary grey, with black margins and black shaft-lines to the feathers, all of which are very glossy; lower back, rump, and upper tail-coverts uniform blue-black glossed with green; bastard-wing, primary-coverts and quills uniform dark brown, the quills paler on the inner webs and hoary grey on the outer webs of some of the secondaries; tail dark brown; head and neck all round dark brown with an oily-green reflection, darker on the crown of the head and hind-neck, paler and inclining to brown on the throat and sides of the face; sides of the face, ear-coverts, and sides of crown covered with white tipped plumes; remainder and entire under-surface blue-black glossed with green. Bill: culmen black, remainder of bill and bare skin leaden grey; iris green; tarsi and feet black. Total length 610 mm.; culmen 48, wing 253, tail 131, tarsus 52.

Adult female. Very similar to the adult male but smaller and with a few white-plumed feathers scattered down the hind-neck. Culmen 42 mm., wing 238, tail 120, tarsus 44.

The immature bird differs from the adult in being more or less brown on the head, sides of the face, fore-neck and chest, and the white-tipped plumes on the head much less numerous.

Nest. Constructed of sticks, leaves, etc., and placed in a tree; in rookeries.

Eggs. Clutch, three to four; ground-colour pale green covered with white lime. Axis 50 to 56 mm., diameter 33-37 (Victoria).

Clutch, four; axis 49 to 50 mm., diameter 31 (Port Darwin).

Breeding-season. August to December (Campbell); May and June (Darwin, 1902).

As with most other Cormorants, very little is known of the life-history of this bird.

Mr. Tom Carter writes me: "In April, 1900, considerable numbers of this species were seen at a White Gum flat (which had been converted into a large swamp after a hurricane) about 25 miles inland from Point Cloates. They did not breed there and were not observed in that locality on any other occasion. When at Carnarvon in September in the years 1911 and 1913, large flocks were seen both in the mangrove creeks and at fresh-water pools in the bed of the Gascoyne River. The district was suffering from a long-continued drought. In each year I picked up several dead birds laid on

THE BIRDS OF AUSTRALIA.

the margins of the pools, and two that I shot and skinned in 1913 appeared to have inflammation of the super-renals, and were in very poor condition."

Mr. J. W. Mellor's notes read: "A well-known little Cormorant, especially on the rivers and inland waters, flying up the streams in small flocks and often congregating in large numbers. It breeds in trees, etc., and eggs in my collection were taken on the Murray River near the Victorian and South Australian border; they have 3 and 4 to a clutch, and lay in rookeries, the nests being set fairly close to one another and composed of sticks, leaves, etc. These little shags were fairly common (on the Coorong) and generally seen in small flocks, sailing and diving in the water, while at times they would sit on the snags and old trees about the water. On one island I noted some of their old nests in the low trees and bushes, but the 'head hunters' had apparently driven them away, and none were breeding now."

In the *Austral Avian Record*, Vol. I., p. 87, 1912, I pointed out that the correct name for this species was *Carbo ater*. Lesson, in the *Traite d'Orn.*, p. 604, 1831, described a bird as *Carbo ater* writing: "Noir en entier; taille d'un canard. De la baie des Chiens marins, à la Nouvelle Hollande." When Pucheran reviewed the Lessonian types in the Paris Museum he gave a detailed description (*Rev. Mag. de Zool.*, 1850, p. 627) and stated that it appeared to be the bird just previously described by Gray as *G. chalconotus*, which he only knew from figure and description. He mentioned that the locality disagreed, but suggested that as other species of *Phalacrocorax* were common to the two countries this might also be the case.

In the *Catalogue* of the Birds in the British Museum, Vol. XXVI., 1898, Ogilvie-Grant placed the name at the head of the synonymy of *P. chalconotus* Gray, with a query stating that the inadequate description did not deserve recognition. Inasmuch as *P. chalconotus* is confined to New Zealand and is very rare there, being probably an evolutionary aberration of *P. stewarti* Grant, some explanation seemed necessary.

The type of *Carbo ater* was collected by Péron and Lesueur at Shark's Bay, West Australia. There has been confusion with regard to the type localities of some of Péron and Lesueur's birds, but this is confined to West Australia, South Australia, and Timor. These voyageurs did not touch at New Zealand, so that their bird could not be referred to *P. chalconotus* Gray.

Looking for a substitute it was quickly seen that the description given by Pucheran differed in no material manner from the present species which lives at Shark's Bay, West Australia.

The bird figured and described is a male, collected at Hermit Hill, Northern Territory, on the 7th of August, 1894, and is the type of *Mesocarbo ater territori*.

GENUS—HYPOLEUCUS.

HYPOLEUCUS Reichenbach, Nat. Syst. Vögel, p. vii.,

1852 Type *H. varius.*

Leucocarbo Bonaparte, Consp. Gen. Av., Vol. II.,

p. 176, 1856 Type *H. bougainvillii.*

MEDIUM to large Phalacrocoracine birds with long slender bills, long wings, short tails *composed of twelve feathers.*

These birds approach species of *Phalacrocorax* closely, from which they differ in the number of the tail-feathers.

The tail is less than half the wing-length and more than twice the length of the metatarsus, which is generally exceeded by the culmen-chord.

This genus is Antarctic in distribution and is composed of birds of bright coloration, usually white underneath and often with facial ornaments of fleshy caruncles.

The type of *Hypoleucus* is as stated above, *H. varius* (Gmelin), not as given in the *Catalogue* of the Birds in the British Museum, Vol. XXVI., p. 331, 1898, *P. hypoleucus*.

This is mentioned, as when Iredale and I used this with other Phalacrocoracine genera in the *Ibis* 1913, pp. 411-416, an amusing letter from the pen of our friend Dr. H. O. Forbes appeared in the *Ibis* 1914, pp. 167-168, commenting in this manner: "Why is the type of *Stictocarbo* now re-designated *punctatus*, instead of *gaimardi*? Surely if the type falls for any reason, the genus falls with it?" As it was obvious that the writer was unacquainted with modern systematic work *personal remonstrance only was made* and the erroneous statements made in the letter pointed out. Dr. Forbes' excuse was that he accepted the types given in the *Catalogue* of the Birds in the British Museum as correct and infallible, which, of course, they are not.

Key to the Species.

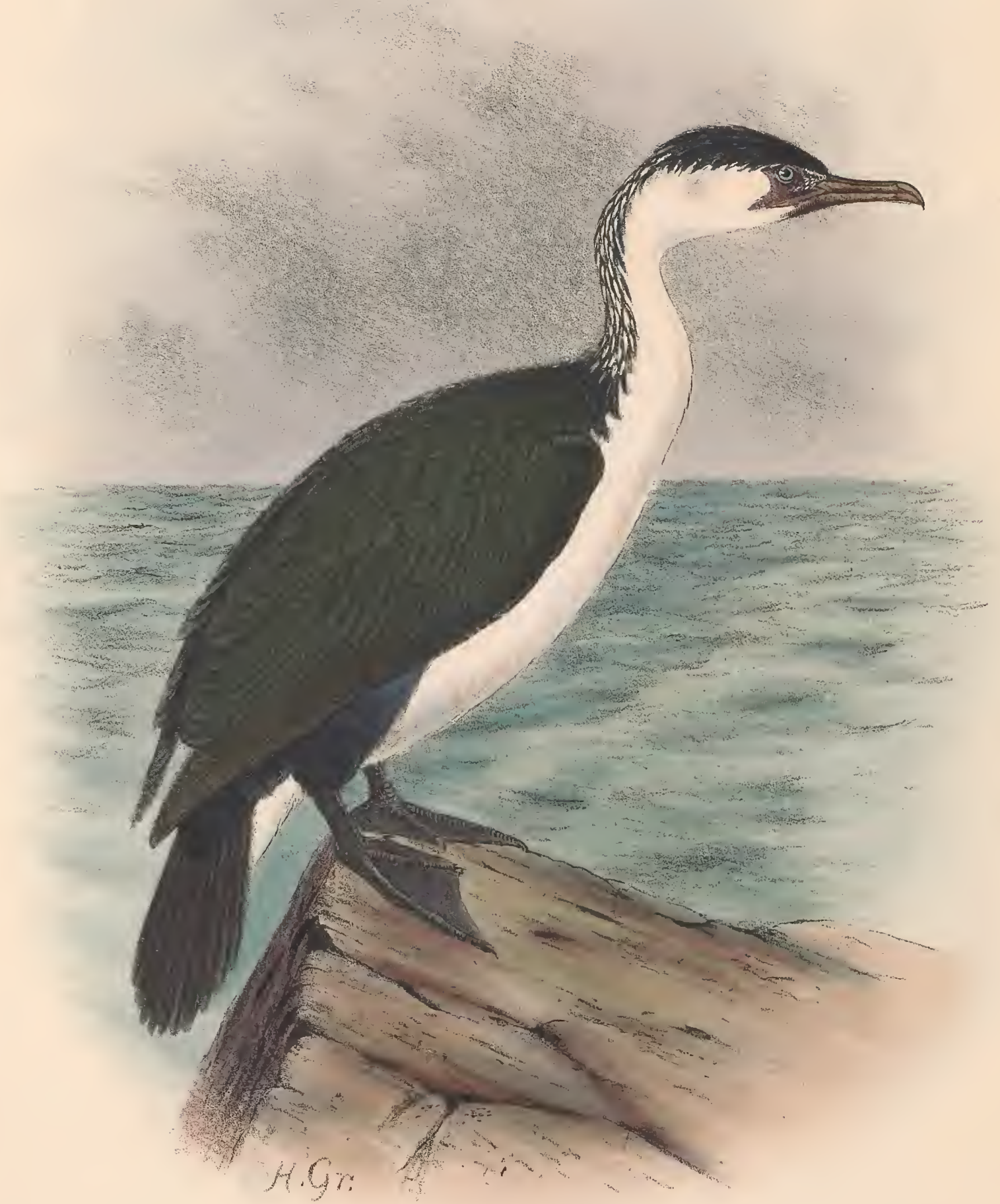
- A. Smaller: wing under 280 mm.; culmen under 55 mm.; feathering extending on to sides of lower mandible *H. fuscescens*, p. 179.
- B. Larger: wing over 280 mm.; culmen over 65 mm.; no feathering on sides of lower mandible *H. varius perthi*, p. 184.



H. fuscescens. $\frac{4}{5}$ nat. size.



H. varius perthi. $\frac{4}{5}$ nat. size.



H. Grönvold, del

Witherby & Co

$\frac{1}{3}$

CARBO GOULDI.
(WHITE-BREASTED CORMORANT).

HYPOLEUCUS FUSCESCENS.

WHITE-BREASTED CORMORANT.

(PLATE 221.)*

HYDROCORAX FUSCESCENS Vieillot, Nouv. Dict. d'Hist. Nat., Vol. VIII., p. 86, 1817 ;
Tasmania.

Hydrocorax fuscescens Vieillot, Nouv. Dict. d'Hist. Nat., Vol. VIII., p. 86, 1817 ;
Pucheran, Rev. Zool. 1850, p. 625.

Carbo hypoleucos Brandt, Bull. Sci. l'Acad. Imp. Sci. St. Petersb., Vol. III., p. 55, 1837 ;
South Australia.

Phalacrocorax leucogaster (not Vieillot, 1817) Gould, Synops. Birds Austr., pt. iv., App.,
p. 7, 1838 : Tasmania ; *id.*, Proc. Zool. Soc. (Lond.) 1837, p. 156, 1838 ; *id.*, Birds
Austr., Vol. VII., pl. 69, 1843 ; Gray, List Birds Brit. Mus., pt. III., p. 187, 1844 ;
Gould, Handb. Birds Austr., Vol. II., p. 492, 1865 ; Müller, Proc. Zool. Soc. (Lond.)
1869, p. 280 ; Legge, Papers and Proc. Roy. Soc. Tasm. 1886, p. 244, 1887 ; *id.*, *ib.*,
1887, p. 96, 1888 ; Witmer Stone, Austral Av. Rec., Vol. I., p. 144, 1913.

Graculus leucogaster Gray, Genera Birds, Vol. III., p. 667, 1845 ; Reichenbach, Synops.
Av. Nat., pl. 63, figs. 875-6, 1850 ; Schlegel, Mus. Pays-Bas, Vol. VI., Pelec.,
p. 20, 1863 ; Gray, Handl. Gen. Sp. Birds, pt. III., p. 128, 1871 ; Ramsay, Proc.
Linn. Soc. N.S.W., Vol. II., p. 203, 1877 ; *id.*, Tab. List Austr. Birds, p. 25, 1888 ;
North, Austr. Mus. Cat., no. 12, p. 366, 1890 ; Le Souëf, Ibis 1895, p. 421.

Hypoleucus leucogaster Bonaparte, Consp. Gen. Av., Vol. II., p. 173, 1856.

Hypoleucus gouldi Salvadori, Ann. Mus. Civ. Gen., Vol. XVIII., p. 404, 1882 : Tasmania ;
id., Orn. Papua. e Mol., Vol. III., p. 413, 1882.

Phalacrocorax gouldi Ogilvie-Grant, Cat. Birds Brit. Mus., Vol. XXVI., p. 396, fig. 8,
1898 ; Hall, Key Birds Austr., p. 101, 1899 ; Campbell, Nests and Eggs Austr.
Birds, Vol. II., p. 973, 1901 ; Hill, Emu, Vol. II., p. 167, 1903 ; Campbell, *ib.*,
p. 209, 1903 ; Hall, Key Birds Austr., 2nd ed., p. 101, 1906 ; Mathews, Handl.
Birds Austral., p. 37, 1908 ; Mattingley, Vict. Nat., Vol. XXV., p. 13, 1908 ;
id., Emu, Vol. VIII., p. 22, 1908 ; Cole, *ib.*, p. 78, 1908 ; White, *ib.*, p. 203, 1909 ;
Littler, *ib.*, Vol. IX., p. 142, 1910 ; *id.*, Handb. Birds Tasm., p. 199, 1910 ;
Ingle, Emu, Vol. X., p. 127, 1910 ; Broadbent, *ib.*, p. 245, 1910 ; White, *ib.*, Vol.
XI., p. 35, 1911 ; Stone, *ib.*, Vol. XII., p. 120, 1912 ; North, Austr. Mus. Spec.
Cat., no. 1, Vol. III., p. 327, 1912 ; White, Emu, Vol. XII., p. 161, 1913.

Carbo gouldi Mathews, Nov. Zool., Vol. XVIII., p. 240, 1912.

* The Plate is lettered *Carbo gouldi*.

THE BIRDS OF AUSTRALIA.

Carbo gouldi tunneyi Mathews, Austral Av. Rec., Vol. I., p. 88, 1912; South-west Australia.

Carbo fuscescens Mathews, Austral Av. Rec., Vol. II., p. 6, 1913.

Carbo fuscescens fuscescens Mathews, *ib.*, p. 7.

Carbo fuscescens tunneyi Mathews, *ib.*, p. 7.

Hypoleucus fuscescens Mathews, List Birds Austr., p. 96, 1913.

DISTRIBUTION : New South Wales; Victoria; Tasmania; South Australia; South-west Australia.

Adult male. Head, hind-neck, entire back, outer sides of the thighs and under wing-coverts glossy blue-black with white plumes intermixed on the sides of the nape, upper hind-neck, and sides of the rump; scapulars and wings oil-green with very narrow black margins to the feathers; quills uniform dark brown; tail greenish-black; sides of the face, throat, fore-neck and entire under-surface of the body pure white. Bill dark horn, base and bare space purple; iris green; feet black. Total length 700 mm.; culmen 54, wing 273, tail 107, tarsus 60.

Adult female. Similar to the adult male but slightly smaller. Culmen 50 mm., wing 270, tail 107, tarsus 54.

Immature. Distinguished chiefly by the brown on the upper-surface, sides of the body, and the outer thighs.

Young. Similar to the above but darker brown, and the head and hind-neck narrowly streaked with white.

Nest. Placed on a reef or on rocks and composed of seaweed, saltbush, etc.; outside dimensions 18 by 4 inches, egg cavity about 9 inches by 2.

Eggs. Clutch, two or three, similar to those of other members of the family. Axis 57 to 60 mm., diameter 36 to 38.

Breeding-season. November, December and January.

THE credit of the discovery of this fine Cormorant has generally been given to Gould, but as I will hereafter more fully explain, it had been described twenty years previously by Vieillot, having been brought back to France from Tasmania by Péron and Lesueur.

Very little is, however, yet known of its life-history, as the succeeding meagre notes show.

Mr. J. W. Mellor's notes read: "This is a thoroughly coastal bird, being very plentiful on all the islands in the Gulfs about the South Australian Coast, and also along the Victorian Coast and Tasmania, and very thick in Bass Straits. In St. Vincent's Gulf and Spencer's Gulf, South Australia, I have seen them in large flocks, also on the rocky reefs and sand spits on Kangaroo Island, South Australia, where in the early days they bred in large rookeries. In an expedition to Spencer's Gulf, South Australia, in the Departmental Steamer 'Governor Musgrave,' in connection with the Adelaide Congress of the Australasian Association for the Advancement of Science, in January, 1907, I had the honour of being the Ornithologist, and landed on Dangerous Reef on Jan. 16th, where we found this bird in large

WHITE-BREASTED CORMORANT.

numbers, carrying on its breeding pursuits, and a note in my diary says: 'The nests were placed on the rocks of this barren reef and composed of seaweed and bits of saltbush and saltweed: two, three, and four eggs were found in a clutch, the two former being common and the latter number rare: there were nests not yet laid in, up to large young ones with feathers just coming. . . . The Silver Gulls were also there, but they were not breeding, and they came down on the Cormorants' nests, and ate the eggs at every chance.' On returning to the Reef next day to obtain photographs of the birds we found that these robbers (the silver gulls) but completely demolished the whole rookery of cormorants, the eggs being eaten up, and the young both large and small laying about dead and mangled by the gulls, but strange to say a rookery of Crested Terns (*Sterna bergii*) had not been molested by the robbers, although hundreds of eggs lay about on the ground in these birds' 'nests,' and the birds had vacated the eggs at our approach: whether this was on account of the coloration of the eggs assimilating the surrounding ground, or whether it was because it was eggs of their own kind it is hard to say.

"On the expedition to Bass's Straits on the SS. 'Manawatia' in connection with the Eighth Congress of the Royal Australasian Ornithologists' Union, we visited Storehouse Island near Babel Island, on Dec. 4, and found several rookeries of these birds, the nests containing fresh eggs up to large birds just ready to fly, showing how varied the nesting times of these birds are. In this instance the normal clutch was three eggs. . . . (On the Coorong) these were the most plentiful of the 'shag' family noted, and were generally perched on some stake or snag in the water or swimming about and diving: they are expert swimmers and divers."

Littler* writes: "The first birds to come under our notice (on Ninth Island, Bass Strait) were White-breasted Cormorants (*Phalacrocorax gouldi*). On a rocky isthmus running out from the south-east corner of the island was a large rookery with incubating operations in full swing. There were between 100 and 150 nests, the majority containing eggs. The rookery was divided into two parts, the portion on the landward side containing eggs absolutely fresh; some of the nests furthest inland were only just ready for their reception: the nests towards the extremity of the isthmus contained eggs somewhat incubated. They were bulky structures of variously coloured seaweed; the egg cavity occasionally contained fragments of tussock-grass, but usually no lining other than fragments of sea *débris* was used. They were placed about two feet apart, on top of the rocks, which were heavily lime-washed. After taking some photographs of the sitting birds—for they

* Emu, Vol. IX., p. 142, 1910.

THE BIRDS OF AUSTRALIA.

allowed one to approach to within three yards on this our first visit—and the nests, a few clutches of eggs were secured, then the birds left in peace. On again visiting the rookery a few days later, it was found that the Silver Gulls (*Larus novæhollandiæ*) had played havoc among the eggs. Later we watched through our field-glasses these Gulls quietly drop down among the nests and steal eggs from unprotected ones, right under the noses of birds sitting hard by. From observations it was found that the Cormorants were afraid of the Silver Gulls, and would not return to protect their nests while any of the impudent robbers were close by. On other parts of the island the remains of extensive rookeries were evident. It was noted that when this Cormorant is in full flight its wing-action much resembles that of the Black Duck (*Anas superciliosa*). For the first few days Silver Gulls were scarce, but after that they greatly increased, and a large flock was always to be seen in the vicinity of the Cormorant rookery.”

In 1837 Gould described this Shag as *P. leucogaster*, and under this name it was generally known until the appearance of the *Catalogue* of Birds in the British Museum, Vol. XXVI., in 1898. There Ogilvie-Grant used for it the name *P. gouldi*, which had been proposed sixteen years earlier by Salvadori, as Gould's name was invalid through its former usage by Vieillot in 1817. This name was then at once accepted on account of the authoritative nature of the work in which it was published. Had Ogilvie-Grant thoroughly gone into the subject he would have found that an earlier name was applicable, and being at that time a consistent user of bedrock priority, he would have introduced the name here utilised and it would have been just as readily accepted as the one he wrongly selected. For, in the synonymy of *P. varius* Gmelin, a New Zealand bird, Ogilvie-Grant placed *Hydrocorax fuscescens* Vieillot, 1817. The description was of an immature bird, and the study of it alone made it doubtful to which species or subspecies it should be allotted. The locality, however, was Australia, so that if that were correct it could not be cited as a synonym of a Neozelanic bird. When Iredale and I worked up the synonymy of the New Zealand Avifauna this was of necessity inquired into, and as it had to be crossed off the synonymy of the Neozelanic species it had to be transferred to that of an Australian bird. The name was then applicable to either *P. gouldi* or *P. hypoleucus*, but it had long priority over both. Examination of the type then became necessary, as it was urgent that such a matter should be definitely and accurately settled. I found that Pucheran had examined the type in the Paris Museum and in the *Revue Zool.* 1850, p. 625, had concluded that it was the juvenile stage of *P. varius* Gmelin. The further information he gave was that it had been collected by Péron and Lesueur and was labelled “Timor.” It is

WHITE-BREASTED CORMORANT.

notorious that the localities West Australia, Tasmania, and Timor were wrongly interchanged in numerous cases in connection with Péron and Lesueur's collection, and it is also well known that these investigators never visited New Zealand. I therefore wrote to Paris, but the authorities were unwilling to risk the forwarding as the specimen was old and valuable. I then had coloured drawings of the heads of the two Australian species made, showing the differences in the bare parts, which do not alter from immature to adult. I forwarded these to M. Ménegaux with a request that he would carefully compare these and decide to which the specimen was referable. M. Ménegaux, to whom my thanks are tendered, made the examination and also sent me a drawing of the head of the type of Vieillot's species. These fixed the name on to the present species, not on to *P. hypoleucus*, as I had anticipated on account of Pucheran's reference to *P. varius* Gmelin. The reason is that Pucheran was quite unaware of the differences between the species which he probably had not in the collection under his care. Hellmayr does not mention anything about the name in his Avifauna of Timor, nor does he include either *P. gouldi* or *P. hypoleucus* in the list.

The species is rare or unknown at Shark's Bay, West Australia, where Péron and Lesueur collected, while it is abundant at their other collecting-ground, Bass Straits. I therefore designated as type locality of Vieillot's bird, Tasmania.

The bird figured and described is a female collected on Peake Islands, south of West Australia, on the 14th of May, 1906.

HYPOLEUCUS VARIUS PERTHI.

PIED CORMORANT.

(PLATE 222.)*

CARBO VARIUS PERTHI Mathews, Austral Av. Rec., Vol. I., p. 88, 1912; Perth, West Australia.

Phalacrocorax hypoleucus (not Brandt 1837) Gould, Birds Austr., Vol. VII., pl. 68, 1843; Ogilvie-Grant, Cat. Birds Brit. Mus., Vol. XXVI., p. 397, 1898; Hall, Key Birds Austr., p. 101, 1899; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 975, 1901; Carter, Emu, Vol. I., p. 127, 1902; Shepherd, *ib.*, Vol. II., p. 32, 1902; Hill, *ib.*, p. 167, 1903; Carter, *ib.*, Vol. III., p. 210, 1904; Hill, *ib.*, p. 229, 1904; Lawson, *ib.*, Vol. IV., p. 132, 1905; Mellor, *ib.*, pp. 159, 161, 1905; Nicholls, *ib.*, Vol. V., p. 82, 1905; A. G. Campbell, *ib.*, p. 145, 1906; Hall, Key Birds Austr., 2nd ed., p. 101, 1906; Ingram, Ibis 1907, p. 396; Mathews, Handl. Birds Austral., p. 37, 1908; Mellor, Emu, Vol. VII., p. 186, 1908; Mattingley, *ib.*, Vol. VIII., p. 22, 1908; Gibson, *ib.*, p. 64, 1908; Gibson, *ib.*, Vol. IX., p. 77, 1909; Hall, Emu, Vol. IX., p. 132, 1909; Ogilvie-Grant, Ibis 1910, p. 172; Campbell and White, Emu, Vol. X., p. 203, 1910; Hill, *ib.*, p. 265, 1911; Stone, *ib.*, Vol. XII., p. 120, 1912; North, Austr. Mus. Spec. Cat., no. 1, Vol. III., p. 330, 1912; White, Emu, Vol. XII., p. 182, 1913; Hill, *ib.*, p. 254, 1913; Barnard, *ib.*, Vol. XIII., p. 209, 1914.

Hypoleucus varius Bonaparte, Consp. Gen. Av., Vol. II., p. 173, 1856 (part).

Phalacrocorax varius (not Gmelin) Gould, Handb. Birds Austr., Vol. II., p. 490, 1865; Walker, Ibis 1892, p. 258.

Graculus varius (not Gmelin) Gray, Handl. Gen. Sp. Birds, pt. III., p. 128, 1871 (part); Ramsay, Proc. Linn. Soc. N.S.W., Vol. II., p. 203, 1878; *id.*, Tab. List Austr. Birds, p. 24, 1888; North, Austr. Mus. Cat., no. 12, p. 365, 1890.

Carbo varius hypoleucos Mathews, Nov. Zool., Vol. XVIII., p. 241, 1912.

Carbo varius perthi Mathews, Austral Av. Rec., Vol. I., p. 88, 1912; Perth, West Australia.

Hypoleucus varius hypoleucus Mathews, List Birds Austr., p. 96, 1913.

DISTRIBUTION. Northern Territory; Queensland; New South Wales; Victoria, Tasmania; South Australia; South-west Australia.

Adult male. Sides of the upper-back, scapulars, upper- and under-surface of the wings dark oil-green with very narrow edgings to the feathers; head, hind-neck, a narrow line on the middle of the upper-back and entire lower-back, rump, and upper tail-

* The Plate is lettered *Carbo hypoleucos*.



H.G.

H. Grönvold. del.

Witherby & Co.

$\frac{1}{4}$

CARBO HYPOLEUCOS.
(PIED CORMORANT).

PIED CORMORANT.

coverts blue-black like the flanks and outer aspect of the thighs; quills and tail-feathers uniform black; sides of the face, sides of neck, throat, fore-neck, and entire surface pure white. Bill dark horn; bare space in front of the eye bright orange, eyelid and rim round the eye rich indigo-blue; throat and cheeks light bluish-ash; iris pale green; feet black. Total length 800 mm.; culmen 70, wing 324, tail 150, tarsus 66.

Adult female. Similar to the adult male.

Immature. This individual, which has nearly attained its full plumage, is conspicuous by having some brown feathers scattered among the white on the fore-neck and sides of the neck.

Nest. Similar to that of *H. v. gouldi*, sometimes placed on the ground, at others in trees.

Eggs. Clutch two, similar to those of other members of the family. Diameter 55 to 58; axis 35 to 37.

Breeding-season. "September to November; March to May" (Campbell). "July" (Carter).

AGAIN I have to record that practically nothing is known of the life-habits of still another bird.

Mr. Tom Carter has written me: "This fine species was abundant about Carnarvon, West Australia, and round the North-west Cape. They bred in great numbers on Fraser Island, about four miles out to sea from my house at Point Cloates. The nests were built in and on a species of flannel-leaved soft bush (Aboriginal, Toondurra-rà) that only grows in the close proximity of the sea or salt water. Many of the nests were touching each other, and they were mostly made from the ends of the branches of this bush with the leaves attached, having evidently been bitten and broken off by the Cormorants. Seaweed was also used to some extent for nesting material. I used to collect the eggs from this island to eat, as a change from bush diet, and found them excellent, without any fishy flavour. When cooked, they reminded me of the Plover eggs (*Vanellus cristatus*) which are in such request in England. One year I brought an almost full-grown young bird to my house, and it remained there for several months although it had its full liberty, and open access to the sea, about 500 yards distant. It used to walk to the beach and go out fishing for several hours daily, returning to the neighbourhood of the kitchen (where it obtained scraps of meat and fish from the cook) for the heat of the day and at sundown."

Mr. E. J. Christian has written me from Victoria: "They can be seen here when there is plenty of water about, especially in one particular open swamp where there are some dead trees. Often on the swamp one sees as many as 50 of these birds doing nothing but perching on the limbs of these trees. I think that they feed on Yabbies, as there are no fish in this creek. On the big dam one can often be seen sitting by the edge of the water for hours and then suddenly he will make a dart with his long neck and catch

THE BIRDS OF AUSTRALIA.

something in the water. Before alighting on a sheet of water I notice that they always fly round a lot, sometimes 5 or 10 minutes. They build in great gum trees in the swamps and billabongs of the Murray. I do not think this bird eats many fish. I watched two birds on a tank: one caught three small fish of about two and a half inches, the other two of the same length. They sunned themselves the rest of the day. Others I have watched are also small eaters."

Mr. Sandland writes: "Seen occasionally at Balah, South Australia, on the Murray River, and also about the Burra district, but always leave the Burra district during the nesting season."

Mr. J. W. Mellor notes: "This fine large white-breasted Cormorant is found fairly well distributed about the coastal districts and the islands of South Australia. I found it breeding on Pelican Island in the Coorong on October 1, 1894; here the nests were built up to the height of 18 inches with a hollow on top in which was three or four eggs, some nests were only in course of construction: they were composed of saltbush and sticks laid across and around until the pile was completed. I have seen the birds also on Kangaroo Island, South Australia, also in St. Vincent's Gulf, and at the mouth of the Port Adelaide River. The yellowish-green skin about the base of the bill and eyes and light-coloured bill at once distinguishes this species from the preceding one, which presents a black bill and dark colouring in the skin about its base."

The present species agrees in detail with the Neozelanic *P. varius* Gmelin so well, that many workers have not differentiated the two. As a matter of fact the Australian bird does differ from the Neozelanic one in that the head, neck and back coloration has a steel-blue sheen while that of the latter shows oily dark green only. This difference can only be regarded as of subspecific value as I have here recognised it.

The other Australian species of the genus is smaller, has the general coloration darker, the head and back much deeper and white feathers on the head and neck much pronounced. In addition, the feathering of the chin and sides of the face differs, as shown in the *Catalogue* of the Birds in the British Museum, Vol. XXVI., pp. 396-7, woodcuts in text, 1898, and this difference determined the acceptance of Vieillot's name *fuscescens* for the preceding bird.

This distinction also necessitates the rejection of Brandt's name *hypoleucus* for the present species. This name was used by Gould in the *Birds of Australia*, but in his *Handbook*, p. 490, he considered the Neozelanic and Australian birds inseparable, and therefore used the earlier name *varius* given to the former. On p. 492, he, however, quoted *Carbo hypoleucus* Brandt, with no reference, as a synonym of his own *Phalacrocorax leucogaster*.

PIED CORMORANT.

Had he given the reference he might have seen that Brandt's name had priority. Gould's names were accepted for over thirty years when Ogilvie-Grant, in the *Catalogue* of the Birds in the British Museum, Vol. XXVI., concluded that the Neozelanic and Australian birds classed under *P. varius* were distinct, and for the latter introduced *Carbo hypoleucos* of Brandt. He showed how similar the two Australian species were and gave figures of the chin and face feathering. Since then Ogilvie-Grant's determination has been accepted without question, but upon investigating the matter closely I find Brandt gave the following description: "Caput et collum supra, nec non dorsum, uropygium hypochondria et femora atra ex viridi sericea. Tectrices alarum griseæ ex atro virèscente anguste marginatæ. Cauda quadrata, breviuscula cum tectricibus atra. Capitis latera, gula, colli anterior pars et latera, pectus, abdomen et crissum candida. Angulus oris, nec non mandibulæ basis nuda. Pedes atrî. Longitudo à rostri apice ad caudæ apicem 2' 2" 9'''. Patria?"

The characters "Cauda . . . breviuscula . . . Angulus oris, nec non mandibulæ basis nuda" fix the name on to the bird called by Ogilvie-Grant *P. gouldi*, but which I now show to have two prior names, *H. fuscescens* Vieillot and *C. hypoleucos* Brandt. The only name available for the present bird is *C. v. perthi*, which I proposed for the Western form but which for the present work I do not recognise as distinct.

The bird figured and described is a male collected on Lake Albert, South Australia, on the 1st of March, 1912, by Captain S. A. White, and is the type of *Hypoleucus varius whitei*.

GENUS—MICROCARBO.

- MICROCARBO Bonaparte, Comptes Rendus Sci.
 (Paris), Vol. XLIII., p. 577, 1856 Type *M. pygmæus.*
- Halieus* Reichenbach, Nat. Syst. Vögel., p. vii.,
 1852 (not *Halicæus* Illiger 1811) Type *M. pygmæus.*
- Also spelt—
Halicæus Bonaparte, Comptes Rendus Sci. (Paris), Vol. XLI.,
 p. 1115, 1855.
Helieus Gould, Handb. Birds Austr., Vol. II., p. 488, 1865.
- Haliator* Heine, Journ. für Ornith., 1860, p. 202 .. Type *M. pygmæus.*
- Melanocarbo* Bernstein in Musschenbroek, Dag-
 boek van Dr. H. A. Bernstein's laatste Reis
 van Ternate, etc., p. 119, 1883 Type *M. melanoleucus.*

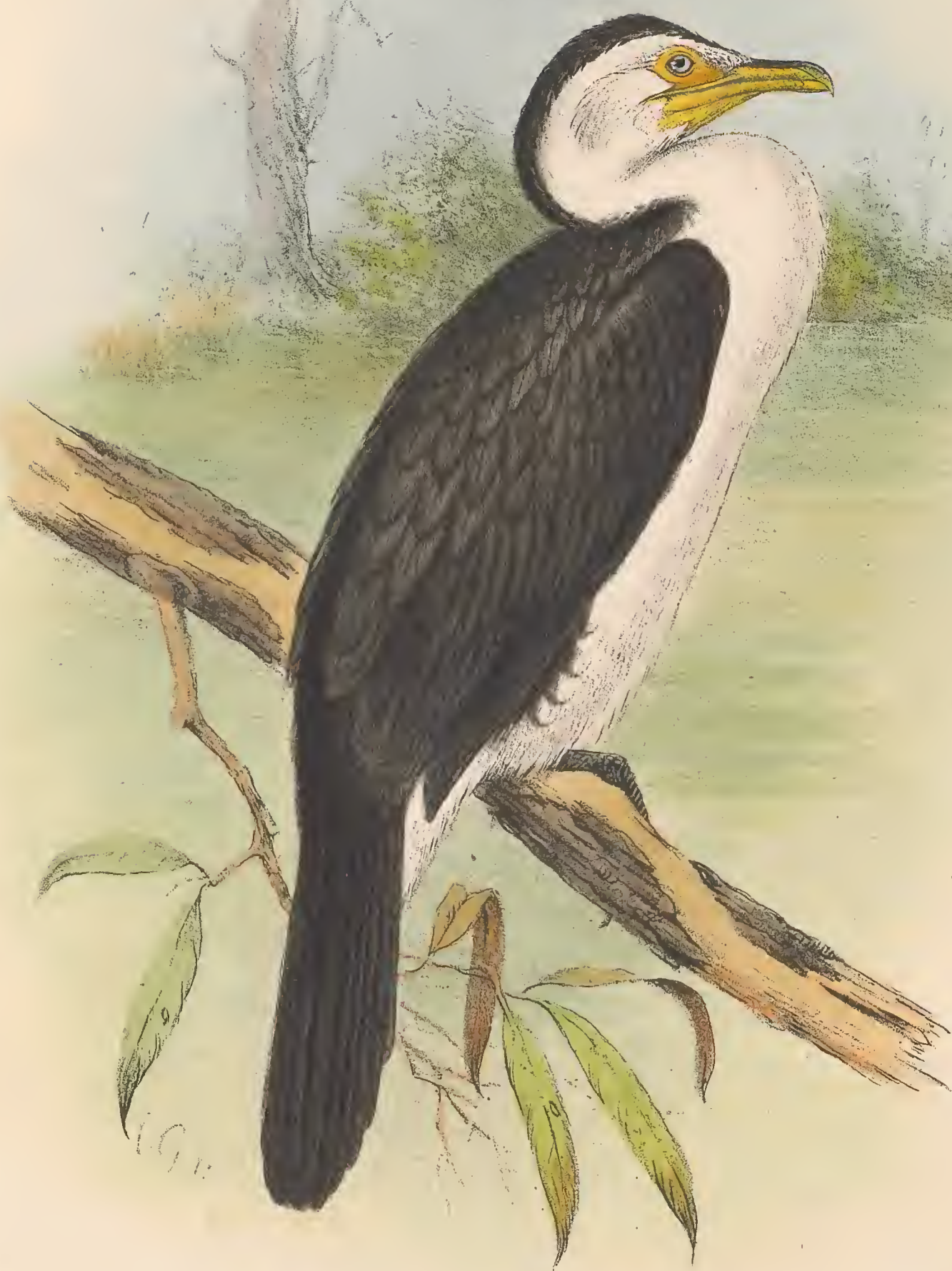
SMALLEST Phalacrocoracine birds with very short bills, long necks, long wings, very long tails and short legs and feet.

The bill is very short, being less than one-sixth the length of the wing and shorter than the metatarsus.

The wing has the primary formula different from any of the preceding genera, having the second and third primaries subequal, the third sometimes the longest, while the first is exceeded by the fourth.

The tail, composed of twelve feathers, is very long, about two-thirds the length of the wing, and four times the length of the culmen or metatarsus.

The feet are delicately formed when contrasted with those of the preceding genera, though comparatively they agree in their proportions.



H. Grönvold, del.

Witherby & Co.

$\frac{2}{5}$

CARBO MELANOLEUCOS.
(LITTLE CORMORANT).

MICROCARBO MELANOLEUCUS MELANOLEUCUS.

LITTLE CORMORANT.

(PLATE 223.)*

HYDROCORAX MELANOLEUCOS Vieillot, Nouv. Dict. d'Hist. Nat., Vol. VIII., p. 88, 1817 ;
New South Wales.

Hydrocorax melanoleucos Vieillot, Nouv. Dict. d'Hist. Nat., Vol. VIII., p. 88, 1817.

Phalacrocorax melanoleucus Stephens, in Shaw's Gen. Zool., Vol. XIII., pt. 1., p. 93, 1826 ;
Gould, Birds Austr., Vol. VII., pl. 70, 1843 ; Gray, List Birds Brit. Mus., pt. III.,
p. 187, 1844 ; Stokes, Discov. in Centr. Austr., Vol. I., p. 483 ; Macgillivray, Narr.
Voy. "Rattlesnake," Vol. II., p. 359, 1852 ; Gould, Handb. Birds Austr., Vol. II.,
p. 493, 1865 ; Legge, Papers and Proc. Roy. Soc. Tasm. 1874, p. 35 ; Ramsay,
Proc. Zool. Soc. (Lond.) 1877, p. 348 ; *id.*, Proc. Linn. Soc. N.S.W., Vol. III.,
p. 302, 1878 ; *id.*, *ib.*, Vol. IV., p. 102, 1879 ; Legge, Papers Proc. Roy. Soc.
Tasm. 1886, p. 244, 1887 ; Ogilvie-Grant, Cat. Birds Brit. Mus., Vol. XXVI., p. 398,
1898 ; Hall, Key Birds Austr., p. 101, 1899 ; A. G. Campbell, Emu, Vol. II., p. 18,
1902 ; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 977, 1901 ; Milligan,
Emu, Vol. II., p. 76, 1902 ; Le Souëf, *ib.*, p. 158, 1903 ; Hill, *ib.*, Vol. III., p. 229,
1904 ; Le Souëf, *ib.*, Vol. IV., p. 138, 1905 ; M'Clymont, *ib.*, p. 177, 1905 ; Hartert,
Nov. Zool., Vol. XII., p. 206, 1905 ; D'Ombraïn, Emu, Vol. V., p. 188, 1906 ;
Hall, Key Birds Austr., 2nd ed., p. 101, 1906 ; Berney, Emu, Vol. VI., p. 155, 1907 ;
Batey, *ib.*, Vol. VII., p. 17, 1907 ; Hill, *ib.*, p. 23, 1907 ; Mattingley, *ib.*, p. 71,
1907 ; Austin, *ib.*, p. 78, 1907 ; Mathews, Handl. Birds Austral., p. 37, 1908 ;
Ingram, Ibis 1908, p. 464 ; Mellor, Emu, Vol. VII., p. 186, 1908 ; Mattingley,
Vict. Nat., Vol. XXV., p. 66, 1908 ; *id.*, Emu, Vol. VIII., pp. 20, 21, 1908 ; Cole,
ib., pp. 76, 77, 1908 ; Hill, *ib.*, p. 223, 1909 ; Mathews, *ib.*, Vol. IX., p. 239,
1910 ; Ogilvie-Grant, Ibis 1910, p. 172 ; Hull, Proc. Linn. Soc. N.S.W., 1909,
Vol. XXXIV., p. 669, 1910 ; Littler, Handb. Birds Tasm., p. 200, 1910 ; Mathews,
Emu, Vol. X., p. 107, 1910 ; Broadbent, *ib.*, p. 245, 1910 ; Barnard, *ib.*,
Vol. XI., p. 20, 1911 ; White, *ib.*, p. 35, 1911 ; Stone, *ib.*, Vol. XII., p. 120,
1912 ; North, Austr. Mus. Spec. Cat., no. 1, Vol. III., p. 333, 1912 ; Chandler, Emu,
Vol. XIII., p. 35, 1913 ; Orton & Sandland, *ib.*, p. 76, 1913 ; White, *ib.*, p. 124,
1914 ; Macgillivray, *ib.*, p. 147, 1914 ; Barnard, *ib.*, Vol. XIV., p. 41, 1914.

* The Plate is lettered *Carbo melanoleucos*.

THE BIRDS OF AUSTRALIA.

Carbo dimidiatus Lesson, Traité d'Orn, p. 604, 1831 : New South Wales ; Pucheran, Revue Mag. Zool. 1850, p. 537.

Phalacrocorax flavirhynchus Gould, Synops. Birds Austr., pt. iv., App., p. 8, 1838 : New South Wales ; *id.*, Proc. Zool. Soc. (Lond.) 1837, p. 157, 1838 ; Stone, Austral Av. Rec., Vol. I., p. 144, 1913.

Graucalus flavirostris Gray, in Dieffenbach's Travels in New Zeal., Vol. II., p. 201, 1843 (Emendation only of Gould's specific name).

Graculus melanoleucus Gray, Genera Birds, Vol. III., p. 667, 1845 ; Reichenbach, Synops. Av. Natat., pl. 63, figs. 872-3, 1850 ; Schlegel, Mus. Pays-Bas, Vol. VI., Pelec., p. 15, 1863 ; Gray, Handl. Gen. Sp. Birds, pt. iii., p. 129, 1871 ; Pelzeln, Ibis 1873, p. 124 ; Ramsay, Proc. Linn. Soc. N.S.W., Vol. II., p. 203, 1878 ; *id.*, Tab. List Austr. Birds, p. 25, 1888 ; North, Aust. Mus. Cat., no. 12, p. 366, 1890.

Halieus melanoleucus Bonaparte, Consp. Gen. Av., Vol. II., p. 177, 1856 (part).

Halieus leucomelas Gloger, Journ. für Orn. 1857, p. 14 (Emendation only of Vieillot's specific name).

Carbo melanoleucus Hartlaub & Finsch, Proc. Zool. Soc. (Lond.) 1868, p. 4.

Carbo melanoleucos melanoleucos Mathews, Nov. Zool., Vol. XVIII., p. 241, 1912.

Carbo melanoleucus melvillensis Mathews, Austral Av. Rec., Vol. I., p. 74, 1912 : Melville Island, Northern Territory.

Microcarbo melanoleucus Mathews, List Birds Austr., p. 97, 1913.

DISTRIBUTION. Australia ; Tasmania.

Adult male. General colour of the upper-surface glossy black ; wing-coverts hoary-grey with black marginal or submarginal edgings ; quills and tail-feathers uniform glossy black ; the feathers on the fore-head, narrow and stiffened, are black ; sides of the fore-head, sides of face, throat, fore-neck, and entire under-surface pure white except the axillaries, under wing-coverts, and under tail-coverts, which are black. Bill and gular pouch yellow, culmen black ; bare skin on face brownish-yellow ; iris greyish-white ; feet black ; second scale on middle toe plum-colour. Total length 610 mm. ; culmen 34, wing 238, tail 165, tarsus 38.

Adult female. Similar in every respect to the adult male but smaller. Wing 232 mm. ; culmen 32, tail 155.

Nestling. With tail and wing-feathers partially developed : is dense black with white feathers interspersed over the entire abdomen, more thickly on the thighs and vent ; the head is quite naked as far as the ear-coverts, which have white tufts. Bill black, basal portion and a patch near the tip of the lower mandible yellowish-white ; fore-head and crown of head dirty white ; throat purplish flesh-colour ; inter-ramal space pale greenish-white ; iris, outer ring dirty white, inner one brown ; feet black.

The immature in this species, as in the majority of others, is chiefly distinguished by its brown upper-surface.

Nest. Composed of sticks and lined with leaves, and placed in low trees.

Eggs. Clutch, three to five, similar to those of other members of the family. Axis 43 to 46 mm. ; diameter 30 to 32.

Breeding-season. September to January (Queensland and New South Wales) ; May (Darwin, Northern Territory).

LITTLE CORMORANT.

ALTHOUGH this bird is very common throughout Australia, I have no notes as to its life-history. Such lack of interest in such a peculiar phase of Cormorant life does not speak highly for the observations of the famed Australian ornithologists who, to quote official utterance, are "conversant with the life-histories and habitats of Australian forms." It is pitiable that the "cabinet ornithologist, unacquainted with Australian field ornithology," should be denied the pleasure of consulting records made by the "working field ornithologists." Again it is written that "so far Australian ornithologists have been too much concerned purely in the study of ornithology (which is a living, virile one in Australian regions)." "Wake up, Australia!" should be the motto of all native ornithologists, as it is about time that you realise that "virile ornithology" is the collation and study of bird-life, whether the bird be a "despised" Cormorant or a delightful Superb Warbler. Examples of real study are now continually appearing in the pages of the *Emu*, and I want to impress upon the field-worker that it is only when the despised "cabinet ornithologist" comes to collate the records that the blanks stand out so plainly. From the systematic point of view this bird is worthy of much study, yet apparently from the field point of view it is negligible. The reverse might have been easily written, but no bird, as regards its life-history, is negligible, as each bird is "virile" and individually demands prolonged study.

Mr. Tom Carter's remarks read: "This species is common in the South-west of Australia and may commonly be seen catching the cray-fish that occur in the inland swamps and watercourses."

Mr. J. W. Mellor's only comments are: "The little white-breasted cormorant is generally distributed about the inland waters as well as the sea-coast and islands of South Australia and the other states: they go in flocks and breed in rookeries like the other members of the family, the clutch being four. I have seen them plentiful in St. Vincent's Gulf, Spencer's Gulf, Kangaroo Island, also on Lakes Alexandrina and Albert and the Coorong, all in South Australia. I also noted them on the Gippsland Lakes, Victoria, and Tuggerah Lakes, New South Wales, and many other similar localities."

In the *Catalogue* of Birds in the British Museum, Vol. XXVI., Ogilvie-Grant recognised *Phalacrocorax melanoleucus* and *P. brevirostris* as two distinct species and therefore admitted the former as a visitor or rare New Zealand bird. Iredale and I (*Ibis* 1913, p. 415) rejected this determination, study of the specimens having convinced us that the two forms were only subspecifically distinct and that the few cases of the occurrence of supposed *P. melanoleucus* in New Zealand were cases of reversion. The recognition of the *P. finschii* Sharpe seemed to confirm this.

THE BIRDS OF AUSTRALIA.

Pucheran (*Rev. Mag. Zool.* 1850, p. 537) has given the following explanation with regard to *Carbo dimidiatus* Lesson: "C'est avec juste raison que cette espèce, que M. Gould avait décrite, en 1837, sous le nom de *Phalacrocorax flavirynchus* a été rapportée à l' *Hydrocorax melanoleucus* de Vieillot. Le type des deux observateurs français est un individu apporté de la Nouvelle-Hollande par Péron et Lesueur."

The bird figured and described is a male collected on Melville Island, Northern Territory, on the 8th of January, 1912, by Mr. J. P. Rogers.

GENUS—ANHINGA.

- ANHINGA Brisson, Ornith., Vol. VI., p. 476, 1760 .. Type *A. anhinga*.
Plotus Linné, Syst. Nat., 12th ed., p. 218, 1766 .. Type *A. anhinga*.
Plottus Scopoli, Introd. Hist. Nat., p. 474, 1777 .. Type *A. anhinga*.

LARGE slender birds with very long necks, long thin pointed bills, long wings, long stiff tail, short legs and long toes, toti-palmate.

The bill is very long and thin, straight and pointed, longer than the head and more than one and a half times the length of the metatarsus, compressed laterally and the edges of both mandibles are finely serrated. The loreal space is naked and there is a small gular pouch; the nostrils obsolete in an ill-defined groove.

The neck is very long and the body slender.

The wings are long, the second and third primaries sub-equal and longest, the first shorter than the fourth.

The tail is very long, composed of twelve broad stiff feathers, fairly evenly rounded, the outside feather rather short. The legs are very stout and short; the metatarsus is less than one-fourth the length of the tail, coarsely reticulate on the front and sides but minutely reticulate on the back.

The toes are long, the middle almost as long as the outer one, hind toe connected with others by a web: all the toes therefore are fully webbed. The outer toe is little longer than the middle one, and is about one and a half times the length of the metatarsus; the middle-claw is finely pectinate.

An extraordinary feature is the wrinkling of the two centre tail-feathers and the longest secondaries.

The Darters, though superficially unlike, have been shown to be specialised Cormorants, and show the closest relationship of any of the toti-palmate group.

The family *Anhingidae* covers the genus *Anhinga* only, which consists of at least five species distributed in an extraordinary manner. The genus is better known by the name of *Plotus*, but the decision of the International Commission on Nomenclature having legalised the Brissonian genera, the name *Anhinga* must be used. For Linné's genus *Plotus* was simply a re-naming of Brisson's genus *Anhinga*, and the bird was unknown to Linné save from Brisson's description.

THE BIRDS OF AUSTRALIA.

I have said five species, though the *Catalogue of the Birds in the British Museum*, Vol. XXVI., only admitted four, but there are obvious contradictions on pp. 411-414 under *Plotus rufus*. This name is worthy of record as an instance of the "furor prioritatis" that overwhelmed Ogilvie-Grant in the preparation of this *Catalogue*. The species *Plotus levaillantii* had borne this name with scarcely a disputant when Ogilvie-Grant brought into use *Plotus rufus*, a name previously absolutely unknown. Thus a name of seventy-five years' standing was superseded by an absolutely "new" name. I agree with Ogilvie-Grant that he adopted the correct course, and by the acceptance of the undoubtedly right name in his work secured the recognition of it by workers universally. I have seen no refutation of his action, yet at the present time Ogilvie-Grant has endorsed a policy of "N.C."—a direct incentive to slovenly work—on the score of inconvenience. His own work in the *Catalogue of Birds* provides a full reply to his own arguments, and it is displeasing to see such a retrograde movement.



Witherby & Co.

$\frac{1}{2}$
PLOTUS NOVÆ-HOLLANDIÆ.
(AUSTRALIAN DARTER).

H. Grönvold, del.

ANHINGA NOVÆHOLLANDIÆ.

DARTER.

(PLATE 224.)*

PLOTUS NOVÆHOLLANDIÆ Gould, Proc. Zool. Soc. (Lond.) 1847, p. 34 ; New South Wales.

New Holland Darter, Latham, Gen. Hist. Birds, Vol. X., p. 435, 1824.

Plotus novæhollandiæ Gould, Proc. Zool. Soc. (Lond.) 1847, p. 34 ; *id.*, Birds Austr., Vol. VII., pl. 75, 1847 ; Reichenbach, Synops. Natat., pl. 58, Nos. 2302-3, pl. 68, figs. 2648-49, 1850 ; Bonaparte, Consp. Gen. Av., Vol. II., p. 181, 1856 ; Gould, Handb. Birds Austr., Vol. II., p. 496, 1865 ; Gray, Handl. Gen. Sp. Birds, pt. III., p. 125, 1871 ; Pelzeln, Ibis 1873, p. 123 ; Buller, Trans. New Zeal. Inst., Vol. VII., p. 217, 1874 ; Ramsay, Proc. Linn. Soc. N.S.W., Vol. I., pp. 386, 395, 1877 ; *id.*, *ib.*, Vol. II., p. 203, 1878 ; *id.*, *ib.*, Vol. III., p. 302, 1878 ; *id.*, *ib.*, Vol. IV., p. 102, 1879 ; *id.*, Proc. Zool. Soc. (Lond.) 1877, p. 349 ; Diggles, Birds Austr., Vol. II., pl. 121, 1877 ; Buller, Man. Birds New Zeal., p. 97, 1882 ; Salvadori, Orn. Papua. e Mol., Vol. III., p. 406, 1883 ; Tristram, Ibis 1886, p. 41 ; Buller, Birds New Zeal., 2nd ed., Vol. II., p. 175, 1888 ; Ramsay, Tab. List Austr. Birds, p. 24, 1888 ; North, Aust. Mus. Cat., no. 12, p. 363, 1890 ; *id.*, Rec. Austr. Mus., Vol. I., p. 147, 1891 ; Ogilvie-Grant, Cat. Birds Brit. Mus., Vol. XXVI., p. 417, 1898 ; Hall, Key Birds Austr., p. 102, 1899 ; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 979, 1901 ; Carter, Emu, Vol. I., p. 127, 1902 ; Le Souëf, *ib.*, Vol. II., p. 158, 1903 ; Hill, *ib.*, p. 167 ; Carter, *ib.*, Vol. III., p. 210, 1904 ; Hall, Key Birds Austr., 2nd ed., p. 102, 1906 ; Buller, Suppl. Birds New Zeal., Vol. II., p. 46, 1906 ; Berney, Emu, Vol. VI., p. 155, 1907 ; Batey, *ib.*, Vol. VII., p. 17, 1907 ; Austin, *ib.*, p. 78, 1907 ; Ingram, Ibis 1907, p. 396 ; Mathews, Handl. Birds Austral., p. 37, 1908 ; Mellor, Emu, Vol. VII., p. 186, 1908 ; Mattingley, *ib.*, Vol. VIII., p. 20, 1908 ; Cole, *ib.*, p. 78, 1908 ; Mathews, *ib.*, Vol. IX., p. 239, 1910 ; Ogilvie-Grant, Ibis 1910, p. 172 ; Carter, *ib.*, p. 656 ; Broadbent, Emu, Vol. X., p. 245, 1910 ; Barnard, *ib.*, Vol. XI., p. 20, 1911 ; Mathews, Nov. Zool., Vol. XVIII., p. 241, 1912 ; Stone, Emu, Vol. XII., p. 121, 1912 ; Hill, *ib.*, p. 254, 1913 ; Witmer Stone, Austral Av. Rec., Vol. I., p. 144, 1913 ; Agnew, Emu, Vol. XIII., p. 94, 1913 ; White, *ib.*, p. 124, 1914 ; Macgillivray, *ib.*, p. 148, 1914 ; Barnard, *ib.*, Vol. XIV., p. 41, 1914.

* The Plate is lettered *Plotus novæhollandiæ*.

THE BIRDS OF AUSTRALIA.

Plotus melanogaster Schlegel, Mus. Pays-Bas, Pelec., Vol. VI., p. 26, 1863 (part).

Anhinga novæhollandiæ Hartert, Katal. Vogels Mus. Senckenb., p. 236, 1891; Mathews, List Birds Austr., p. 97, 1913.

Plotus novæhollandiæ derbyi Mathews, Austral Av. Rec., Vol. I., p. 74, 1912: Derby, North-west Australia.

Plotus novæhollandiæ novæhollandiæ Mathews, Austral Av. Rec., Vol. I., p. 74, 1912; Mathews and Iredale, Ibis 1913, p. 416.

DISTRIBUTION. Australia.

Adult male. General colour above and below glossy blue-black; a broad white band on each side of the head enclosing the eye and extending on to the sides of the upper-neck; naked part of throat edged with white; a large patch of chestnut on the fore-neck; the feathers on the lower hind-neck and upper-mantle more or less chestnut at the base; scapulars and wing-coverts centred with white; quills and tail-feathers uniform black, the two central tail-feathers being transversely waved; innermost secondaries and tail-feathers ribbed. Bill olive-green, base of upper mandible brown, base of lower mandible and bare skin yellow; iris pale yellow; feet whitish-brown, toes darker. Total length 890 mm.; culmen 79, wing 347, tail 217, tarsus 48.

Adult female. Head and hind-neck dark brown, becoming paler on the latter and everywhere mixed with white, a white line from the cheeks extending down the sides of the neck; middle of back rust-brown; scapulars dark brown centred with white; wing-coverts brown, or black, also centred with white, major-coverts black and white; bastard-wing, primary-coverts and quills uniform slatey-black, the innermost secondaries white on the outer webs; tail, centre feathers silvery-grey, the outer ones darker and more slate-grey; chin, throat, and entire under-surface buffy-white, a black patch on each side of the breast; outer edge of wing buffy-white. Bill bluish-grey, yellowish-grey below; iris pale yellow; feet creamy-yellow. Culmen 67 mm., wing 357, tail 230, tarsus 44.

Immature male (bird of the first year). Similar to the adult female, but differs in being darker on the back, the throat and fore-neck buff, the crown of head and hind-neck much darker brown, and the white streak on the cheeks distinctly outlined, as also the white edges to the feathers of the throat.

Immature male (second year). This bird shows an advance of plumage by being darker on the head, hind-neck, and entire back; the lower fore-neck is black, dark feathers are distributed over the under-surface, and the under tail-coverts are mixed with rufous.

Immature male (third year). This individual is very nearly in the adult plumage, but still retains the brown of the immature on the top of the head and hind-neck; the rufous on the fore-neck is more extensive and is intermixed with the black of the throat, and the white on the chin and sides of the head is well developed.

Nestling. Covered with white down below and rusty-red on the neck and wing-coverts. The head and throat bare; on the sides of the neck the white streak is just noticeable. Wings and tail black, tipped with buff.

Nest. A platform composed of twigs and lined with leaves, about 16 in. across. Usually placed in low trees.

Eggs. Clutch, three or four; ground-colour greenish, covered with a coating of whitish lime. Axis 54-58 mm.; diameter 33-36.

Breeding-season. October to January, East Australia. February and March (Elsey), North-west Australia. May and June, Northern Territory.

DARTER.

LITTLE is known of the life-history of this strange bird, and little interest seems to have been as yet taken in it by Australian ornithologists.

Mr. J. W. Mellor has written me: "This bird is not common in South Australia but I have noted it on the River Murray, also on the waters of the River Clarence and Richmond River in New South Wales."

Mr. Tom Carter states: "According to my experience this curious bird is rare in West Australia, having only twice come under my observation during a residence there of nearly thirty years. One was seen and shot by me at a pool on my inland run 60 miles S.E. of Point Cloates. Some of my natives called my attention to it as being a strange bird to them. The remains of a dead Darter were picked up on the banks of the Pallenup (or Salt) River which runs S.E. from Broome Hill. The head was in good condition and proved the identity beyond any doubt."

Mr. J. P. Rogers has added: "March 14, 1902. Jimbaloorra Swamp near Derby, North-west Australia. Large colony found; nests were built in some low Coolibah trees in the centre of the swamp. Depth of water about four feet. There were also many nests of a Cormorant (species not known for sure). The two species were friendly with each other, as the nests were built close together. Most of the nests contained young naked birds. The Plotus young were flesh-colour, and the Cormorants black. The number in a clutch is four, being the same in each species.

"Jan. 13, 1912. Ten miles South-east of Snake Bay, Melville Island. A bird of this species was seen to-day. Jan. 14, 1912. I heard one calling to-day but could not see it. These were the only two I have seen or heard on the Island."

Berney (*Emu*, Vol. VI., p. 155, 1907) notes: "This species is seen occasionally (Richmond District, North Queensland), but is far from common on our larger and deeper water-holes. When chasing fish beneath the surface of the water it pierces its prey through the centre with the upper bill, and coming to the surface tosses it into the air, catches it and swallows it. I think the prey is taken by impaling every time."

Gould's account has not yet been much improved though written over fifty years ago: "Shy and seclusive in disposition, it usually takes up its abode in localities little frequented by man: seeks its prey in the water, dives with the greatest ease to the bottom of the deepest pools, and is as active in this element as can well be imagined. It ordinarily swims with a considerable portion of the body above the surface of the water, but upon being disturbed immediately sinks beneath it, leaving the head and neck only to be seen, and these, from their form and the motion communicated to them by the action of swimming, present a close resemblance to those of

THE BIRDS OF AUSTRALIA.

a snake. Its food consists of fish, aquatic insects, newts, frogs, etc. After feeding it perches on a snag of some fallen tree in the water, or on the naked branch of a tree in the forest nigh to its haunts, often on one of the greatest height, where it sits motionless for hours together. While thus perched it is much more easily approached and shot than on the water, where it is wary in the extreme."

Elsey wrote to Gould an account which was first published in the *Proc. Zool. Soc. (Lond.)* 1857, p. 28, and then incorporated in the *Handbook* and thence transferred to *Campbell's Nests and Eggs*, and I now here reprint it to emphasize the scarcity of observations during a period of over fifty years. Elsey's letter concerned the locality round the Victoria River Depot, North-west Australia, and he stated: "The *Plotus* is common here, and excellent eating. During February and March it was incubating. It chooses large trees that hang over the water above or through the mangroves, and in these a number of them build a colony of large coarse flattish nests of dead sticks and twigs, which appear, from the quantity of dirt about them and their stained appearance, to be used year after year. Each season they place in the centre a few fresh green leaves, and on these lay three or four white eggs, with a very earthy opaque but brittle shell: the lining membrane is of a blue-grey colour; they are rather smaller and more elongated than a hen's egg. We have enjoyed many fine meals of these eggs, sometimes getting from forty to fifty in a single tree. Both birds sit. The male is of a glossy greenish-black, with a little brownish-grey on the wings and wing-coverts. The female has a white under-surface, but is otherwise similar."

The birds figured and described were collected at Derby, North-west Australia, in 1898.

GENUS—PISCATRIX.

PISCATRIX Reichenbach, Nat. Syst. Vögel, p. vi., 1852 . . . Type *P. sula*.

LARGE Suline birds, comparatively small for this family, with long straight bills not hooked but bent at the tip, long thick neck, long wings, short legs and long toes, all the toes, including the hind toe, being connected with a web.

The bill is longer than the head, rather broad at the base, laterally compressed anteriorly; culmen ridge flattened and separated from laterals by a linear groove extending the whole length of the bill and showing no nostrils.

The edges of the mandibles coarsely serrated, the serrations obsolete towards the base, the rami of lower mandible strong and deep enclosing a very narrow unfeathered pouch, the featherless tract extending round the base of the mandibles and round the eyes, the chin being naked.

The culmen is less than half the length of the tail and more than twice the length of the metatarsus.

The wing is long, but not twice the length of the tail; the first primary is longest.

The tail is very long and wedge-shaped; it is composed of fourteen or sixteen feathers: probably the latter is the full number, the former due to age or moult. It is more than twice the length of the culmen and more than half the length of the wing.

The legs are short and stout; the metatarsus is coarsely reticulate throughout, the scales smaller on the back; in length the metatarsus is less than half the culmen. The toes are long, the outer one slightly exceeding the middle one, which has the claw pectinated: the outer toe is about one and a half times the length of the metatarsus; all the toes are fully webbed, the hind toe connected to the inner with a web. The toes are reticulate; this is peculiar, as generally in birds even having different metatarsal covering the toes bear regular scutes, apparently for ease in bending. This would seem to be the oldest toe-covering, but examination of the downy young of this genus shows the toe-covering to be more or less reticulate at that stage, the anterior joints showing irregular scutes broken up, the posterior joints regular reticulation. The downy young also shows no pectination on the

THE BIRDS OF AUSTRALIA.

middle claw; in the bill in the same stage a rather distinct hooked tip is seen and the nostrils are distinctly shown as linear slits in a broad groove between the culmen and lateral edge, while serrations are not yet in evidence on the edges of the mandibles.

The preceding applies wholly to *Piscatrix*.

In the *Austral Avian Record*, Vol. II., pp. 55-6, 1913, I wrote as follows:

"*Parasula*, gen. nov. Differs from *Sula* Brisson in its much larger size and different number of tail-feathers: from *Morus* Vieillot in the different number of tail-feathers. Type, *Sula dactylatra bedouti* Mathews.

"*Hemisula* gen. nov. Differs from *Sula* Brisson in the number of tail-feathers and its proportionately shorter tail. Type, *Sula leucogaster rogersi* Mathews.

"NOTE.—All the Gannets have been lately, and without much reason, included in the genus *Sula*. The differences in size, coloration, structural proportions, and number of tail-feathers have all been ignored in favour of the view that, as the birds bore a family resemblance, they *must* be referred to one genus. If genera with any pretence to affinity be recognised, then *Sula* must be subdivided. The nomenclatural problems are too complex to be detailed here but will be fully discussed in my *Birds of Australia*. The species *Pelecanus bassanus* Linné and *Sula dactylatra* Lesson (*cyanops* Auct.) agree somewhat in size and coloration, but the former has twelve tail-feathers, the latter eighteen. The species *Pelecanus piscator* Linné and *Pelecanus leucogaster* Boddaert agree somewhat in size, but the former has sixteen tail-feathers, the latter fourteen; the last-named disagrees entirely in coloration from the other three. In structural proportions these all differ notably. It must be admitted by every reasoning ornithologist that the difference between twelve and eighteen tail-feathers must be considered of generic import when it is realised that the former occurs in the North Atlantic and in the South Pacific, where it lives side by side with the latter. In the same manner the difference in coloration between *P. leucogaster* Boddaert and the others in itself would justify generic separation, when it is remembered that all the other genera and species have a uniform style of coloration which is quite different, and one which is practically unchanged in the same species with a North Atlantic, South Atlantic, and South Pacific distribution."

I herewith attempt to dispose of my promise as reprinted above, and further study has indicated facts which prove the soundness of my subdivision.

In the *Catalogue of the Birds in the British Museum*, Vol. XXVI., 1898, Ogilvie-Grant included all the species of the family *Sulidæ* under one genus-name *Sula*. Eight synonyms are given and types are named against each,

PISCATRIX.

and if these had been correctly determined, three generic names would at once have been available, but unfortunately neither the species nor the genera were accurately fixed.

First, as type of *Sula* Brisson is given *Sula sula*; as the type of *Sula* Brisson by tautonymy must be *Sula* of Brisson, which equals *Pelecanus leucogaster* Boddaert, Ogilvie-Grant's statement reads wrongly, and his identification of *Sula sula* was wrong, but his statement is right, the name used being wrong. Then the type of *Dysporus* Illiger is stated to be *Sula bassana*, but as Illiger's name was simply a classical substitute for *Sula* Brisson, the type must be that of Brisson's genus. *Morus* Vieillot is given as of the *Nouv. Dict. d'Hist. Nat.* 1817 and the type named *S. sula*, but that name was proposed by Vieillot in the *Analyse nouv. Ornith.* 1816, and the type by monotypy is *Pelecanus bassanus* Linné.

"*Plaucus* Rafinesque, *Analyse*, p. 69, 1815: *Reichenb. Av. Syst. Nat.*, p. vi., 1850. Type *S. bassana*" is included, but Richmond (*Proceedings U.S. Nat. Mus.*, Vol. XXXV., p. 633, footnote, 1908) has observed: "*Plaucus* of Rafinesque, a *nomen nudum*, is one of 'Les Rapaces' of that author, and placed in the 'Sous-famille *Ptiloderia*, Les Nudicolles' near *Vultur*. Grant (*Catalogue of the Birds in the British Museum*, Vol. XXVI., p. 423), synonymizes it with *Sula*!"

Reichenbach's name was also spelt *Plaucus*.

In view of such confusion the only possible method is to begin at the beginning and make out what I consider to be a correct list of names. The references are given in detail in my synonymy:

<i>Sula</i> Brisson 1760	Type <i>Pelecanus leucogaster</i> Boddaert.
<i>Sula</i> Scopoli 1777	= <i>Sula</i> Brisson.
<i>Sula</i> Lacepède 1799	= <i>Sula</i> Brisson.
<i>Dysporus</i> Illiger 1811	New name for <i>Sula</i> Brisson.
<i>Sularius</i> Rafinesque 1815	New name for " <i>Sula</i> Lac."
<i>Morus</i> Vieillot, April 1816	Type <i>P. bassanus</i> Linné.
<i>Moris</i> Leach 1816 (August)	Nomen nudum and =
<i>Moris</i> Forster 1817	= <i>Morus</i> Vieillot.
<i>Dysporus</i> Reichenbach 1852	= <i>Dysporus</i> Illiger.
<i>Piscatrix</i> Reichenbach 1852	Type <i>P. candida</i> = <i>P. sula</i> Linné.
<i>Sula</i> Reichenbach 1852	Type <i>P. leucogaster</i> Boddaert.
<i>Plaucus</i> Reichenbach 1852	Type <i>P. bassanus</i> Linné.
<i>Abeltera</i> Heine 1890	New name for " <i>Sula</i> Rchb."

The above needs a little explanation. *Sula* was first proposed by Brisson, a non-binomial writer, and as one of his species was named "*Sula*" alone,

THE BIRDS OF AUSTRALIA.

that species automatically becomes the type of the genus, and that is the *Pelecanus leucogaster* Boddaert, as determined by W. L. Sclater as hereafter observed.

Scopoli was the first binomial writer to use Brisson's genus name and his usage was equivalent to that of Brisson. Lacepède afterwards named a genus *Sula*, simply giving a diagnosis with no species attached and that covered the same forms as Brisson. Daudin almost immediately added species to Lacepède's genus name and his congregation was Brissonian, so that the type remained the same.

Illiger simply introduced *Dysporus* because *Sula* was not a classical word, and as authorities for the *Sula* he displaced he named "Briss., Scop., Cuv., Lacep., Dumeril." Illiger's name then falls as an absolute synonym of *Sula* Brisson. This must be emphasized, as this name has so often been used for the group typified by *P. bassanus* Linné, and this is incorrect. This group is a valid genus, so that this point requires full consideration.

Rafinesque substituted *Sularius*, as "*Sula* Lac." did not meet with his approval.

Vieillot in his *Analyse* proposed *Morus*, giving as example "Fou de Bassan Buff." He notes "*Pelecanus* Linn. Gm. Lath." and never mentions *Sula* in any connection. Hence the name must be construed on the facts and the type by monotypy is *Pelecanus bassanus* Linné. It is probable that Vieillot simply intended *Morus* as an improvement on *Sula* Brisson, as in the following year (in the *Nouv. Dict. d'Hist. Nat.*) *Morus* is used for all the Gannets exactly agreeing with *Sula* Brisson. In a List of British Birds not recognised as an available list for nomenclatural purposes, Leach used *Moris* for the British Gannet. Vieillot's work was published before April, while Leach's did not appear before August in the same year (1816). In the following year (1817) Forster used Leach's name *Moris* in an acceptable manner for the same species, which, of course, is equivalent to *Morus* Vieillot.

No attempt at subdivision appears to have been made until Reichenbach named four genera in 1852. He was somewhat unfortunate in his selection of generic and specific names as here shown:

<i>Dysporus</i> Ill.	<i>bassanus</i> Briss.
<i>Piscatrix</i> Reichb.	<i>candida</i> Briss.
<i>Sula</i> Briss.	<i>fusca</i> Briss.
<i>Plancus</i> Klein.	<i>maior</i> Rchb.

Reichenbach apparently intended to name four distinct groups, which are easily noted when Gannets are examined, but his names only cover three species; the first and last species names are synonymous. The first name is invalid as it is a synonym of *Sula* Brisson, while the last name is preoccupied.

PISCATRIX.

It will be noted that Reichenbach refers *Plancus* to Klein: that writer was pre-Linnean and non-binomial, and before Reichenbach revived Klein's name it had been adopted in another sense twenty years earlier, ignoring Rafinesque's introduction of a *nomen nudum*.

Bonaparte in the *Consp. Gen. Av.*, Vol. II., pp. 164-166, 1856, used *Dysporus* Ill. for his *P. sula* group (by which he meant what we call *P. leucogaster*); *Sula* ex Brisson as of Vieillot 1818 for a series comprising *P. bassanus* Linné and its relations and also *S. dactylatra* Lesson, and *Piscatrix* Reichenbach for the "*candida* Briss." group. Since Bonaparte's time, nearly sixty years ago, no one seems to have studied this group at all closely. Baird, Brewer and Ridgway (*Water Birds of North Amer.*, Vol. II., p. 170, 1884) thirty years ago commented: "The Gannets are perhaps properly separable into two genera, *Sula* and *Dysporus*, the latter including only the *S. bassana*. But in considering the small number of American species, no great violence will be done in referring them to a single genus." As synonyms of *Sula* Brisson, of which the type is given "by elimination" as *Pelecanus leucogaster* Bodd., *Dysporus* Illig., type *P. bassanus* Linn., *Piscatrix* Reich., type *P. piscator* Linn., and *Plancus* Reich., type *P. parvus* Gmel. (?), are cited. A careful examination of the forms associated would probably have induced a change of opinion, as it would have shown a confusion of distinct generic types.

The reference of all the species to one genus by Ogilvie-Grant obviated any discussion of their relationships; such would be the natural conclusion, but Ogilvie-Grant's classification shows signs of careful work, so that some other and more complex solution is required.

Once more I note that the treatment in the *Catalogue of the Birds in the British Museum*, regardless of the personality of the compiler, has prejudiced all later work, and again we see this reflected in the American Ornithologists' Union's *Checklist*, 3rd ed., 1910, where *Sula* is admitted with no subgenera indicated, though such diverse forms as *Sula cyanops* (Sundevall) (recte *S. dactylatra* Lesson), *Sula leucogastra* (Boddaert), *Sula piscator* Linné (recte *S. sula* Linné) and *Sula bassana* Linné are included. A comparatively casual examination by an American ornithologist would have shown how unscientific such an association was. I shall attempt to show hereafter how distinct the genera are and how they may be defined.

I have given the diagnosis of the genus *Piscatrix* in full, and would note the comparative differences observed and their importance.

It must first be remembered that throughout the following remarks the species name "*sula* Linné" refers to the bird described in the *Catalogue of Birds* under the name *S. piscator* Linné and not under the name *S. sula* Linné. The impropriety of the usage of the latter name for the bird described by

THE BIRDS OF AUSTRALIA.

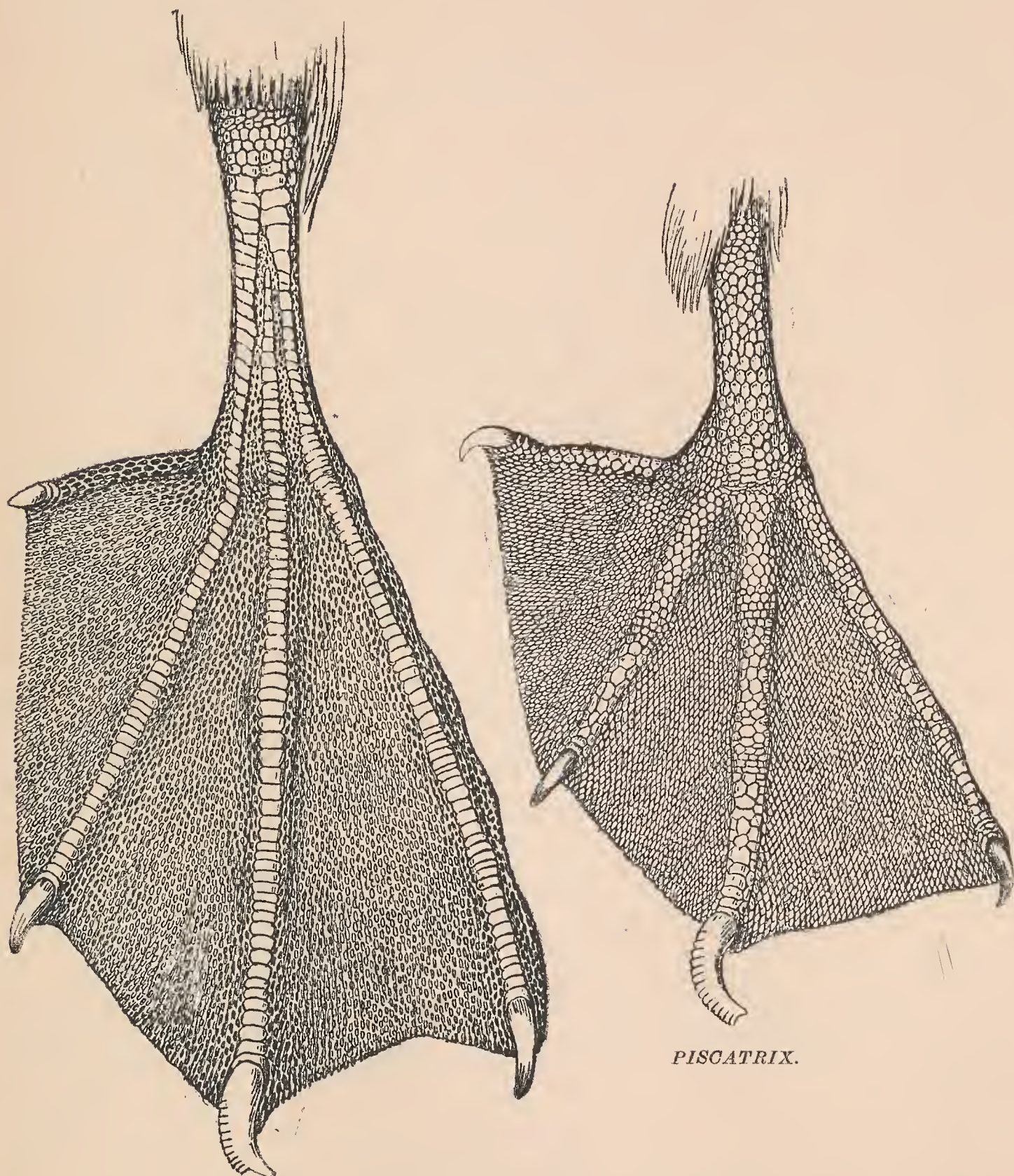
Ogilvie-Grant was shown some years ago and I will show later that Linné's *Pelecanus piscator* is untenable and that we must fall back upon Linné's *Pelecanus sula* for the "*piscator*" bird. Firstly, *P. bassanus* Linné is distinguished from all other members of the family *Sulidæ* by its large size and feathered face. When Baird, Brewer and Ridgway wrote: "*Dysporus*: the latter including only the *S. bassana*," this was governed by its reference to American birds only, for superficially wherever *S. bassana* is generically placed, the South African *capensis* and the Australasian *serrator* must follow. That is, at the first glance, *Pelecanus bassanus* Linné, *Dysporus capensis* Lichtenstein, and *Sula serrator* Gray form a natural group separated by the feathering of the face from all the other Gannets. This superficial difference is emphasized by the fact that the tail is composed of twelve feathers only, whereas in every other Gannet the tail consists of fourteen, sixteen, or eighteen feathers. Although the "*bassana*" group show the greatest wing-length, it has comparatively the shortest bill, and though possessed of a long tail, this is exceeded proportionately by other members of the family. The culmen is less than twice the length of the tarsus and less than half the length of the tail, while the tail is less than half the wing in length. These proportions are shown by no other Gannet, though common to the three above associated.

These facts would, in any other group, force the acknowledgment of the validity of the generic distinction by a scientific ornithologist. I now show a character which necessitates the instant admission of this generic group. The most reckless genus-lumper must be convinced that these birds deserve generic recognition when the scaly coverings of the legs and feet are demonstrated. I here give carefully-prepared drawings of the legs and feet of *Piscatrix sula rubripes* (Gould) and *Sulita serrator dyotti* (Mathews). The former shows the characters I have detailed under the generic heading (*ante*) and the difference seen may be thus described. In the genus *Sulita* the toe-covering consists of a single row of regular scutes very distinct, and this row is continued in each case up the front of the metatarsus, a condition I have not heretofore observed in any bird, though I have closely examined the legs of most of the species of the Orders *Ralliformes*, *Podicipiformes*, *Procellariiformes*, *Lariiformes*, *Charadriiformes*, *Ardeiformes* and *Anseriformes*.

This extraordinary leg-covering only occurs in the three Gannets superficially associated as above, and is a wonderful confirmation of the accurate gauging of such characters. *This leg-covering is seen in the downy young, with the egg-tooth still preserved in Sulita bassana*, exactly as it is shown in the adult. This proves the ancient character of this feature. Now in the downy young of *Piscatrix sula*, as shown above, the characters seen in the adult

PISCATRIX.

also occur almost unchanged. This indicates the very early divorce of the genus *Sulita* from the genus *Piscatrix*.



SULITA.

PISCATRIX.

No systematist with any pretence to accuracy can now associate *Pelecanus bassanus* Linné in the same genus as *Pelecanus sula* Linné.

THE BIRDS OF AUSTRALIA.

When the remaining Gannets come to be examined, these all agree in having bare faces as described under the genus *Piscatrix*, and to the genus-lumper might constitute a single genus. They differ sufficiently, however, to be considered separable and I call the differences generic. For criticism of the plumage changes, combined with study of the varied proportions, show that this group is a very ancient one, a conclusion confirmed by study of their osteology, and that slight superficial distinction is of great phylogenetic value.

I notice that the females exceed the males in size generally throughout the family.

The birds pass through a brown coloration, uniform at first, then white on the belly and then white above. In the genus *Sulita*, distinct plumage changes differ from those of the remainder of the family; and in the genus *Sula*, which name falls upon my *Hemisula*—a name I provided for the species *Pelecanus leucogaster* Boddaert,—the brown coloration is retained in the adult, the breast and the remainder of the under-parts only becoming white. In addition to this retention of an immature phase of plumage, the only case in the family, *Sula* is characterised by its short tail and longer legs when contrasted with *Piscatrix*, which has also, while developing its tail-length, added a couple of tail-feathers to the two that *Piscatrix* has additional to the twelve of *Sulita*.

Sula has the culmen more than twice the length of the metatarsus, while the tail is about twice the length of the culmen and also about half the length of the wing. The fact that this would tend to show is that *Piscatrix* has developed in exactly the opposite direction from *Sula*, though both have been derived from the same source. Both are small Gannets with long wings.

The last form I would recognise is that typified by *Sula dactylatra* Lesson. This agrees in general coloration and structural features with *Piscatrix*, but the birds are large with a wing-length nearly equal to that of *Sulita*. The bill is very large proportionately, while the tail is comparatively short. The bill is more than half the length of the tail, which is decidedly less than half the length of the wing, while the tarsus is more than half the length of the bill.

I have carefully considered the above and there can be no other conclusion than that the four groups should be recognised, and I maintain that these are of generic value. If such differences were proportionately observed in the Passeriformes, the birds showing them would be placed in different families. When a couple of tail feathers appear in a bird intervening between birds geographically as far apart as the poles, yet agreeing exactly, that

PISCATRIX.

bird must have undergone an environmental stress disproportionate to the alteration seen.

An artificial key of the genera might be thus framed: half a dozen other characters could be added in each case.

A. Wing over 420 mm.

a' Bill more than half the length of the tail .. *Parasula*.

b' Bill less than half the length of the tail .. *Sulita*.

B. Wing under 420 mm.

c' Bill more than half the length of the tail .. *Sula*.

d' Bill less than half the length of the tail .. *Piscatrix*.

The preceding review is practically as written some months ago with the alteration of a few words only. I have left it, as it is rather a good example of the confusion commonly attending the interpretation of the Brissonian generic names. In the American Ornithologists' Union's *Check-list*, 3rd Edition, 1910, p. 60, *Sula* was used as of Brisson, the type being given as "[*Sula*] *sula* Brisson=*Pelecanus piscator* Linnæus." It was due to the influence of American ornithologists that the Brissonian genera were concluded to be valid by the International Commission on Zoological Nomenclature. Consequently it would be considered that the supporters of Brisson would have accurately determined his types. I examined the description given by Brisson of his "*Sula*" and concluded it agreed fairly well with the bird known as "*leucogaster* Boddaert": there was a probability however that it might have been based on the immature of the bird known (wrongly) as "*piscator* Linné." I was unable to definitely decide the question and therefore accepted the American view, though not absolutely certain as to its accuracy.

While this account was in the press, W. L. Sclater has decided in favour of my first opinion, and I therefore reproduce his arguments before I give my criticism of some of his details.

In the *Bull. Brit. Orn. Club*, Vol. XXXV., p. 48, Jan. 27, 1915, he wrote: "Recently when engaged in preparing the new edition of the B.O.U. List of British Birds, I had occasion to look into the question of the type of the genus *Sula*, and as I find I am not in agreement with what may be called the recognized authorities, I have put together the results of my researches in the following note:

"The genus *Sula* was first proposed by Brisson (*Orn.*, Vol. VI., 1760, p. 494), and the type is without doubt [*Sula*] *sula* Brisson. This bird is, to my mind, the Brown Booby of tropical seas, which is generally known as *Sula sula* Linn., and is so described by Ogilvie-Grant (*Cat. Birds B. M.*, XXVI., 1898, p. 436).

THE BIRDS OF AUSTRALIA.

“The further question arises as to what is the correct name for the Brown Booby. In the 10th Edition of Linnæus, apart from the Solan Goose, only one Booby is mentioned: this is *Pelecanus piscator* (p. 134). The diagnosis is very imperfect, and might do for either the Brown or the Red-footed Booby, which is named in the Catalogue ‘*S. piscator*.’ The first reference, on which this species is founded or partially founded, is to Osbeck’s ‘Travels in China.’ On referring to this work (p. 85 of the original Swedish edition, 1757: p. 127 of the English translation) it will be found that Osbeck came across both species—the Brown and the Red-footed—in July, 1751, when off the south coast of Java, and that he believed that these were male and female respectively of the same species. Linnæus’ *Pelecanus piscator* was founded on this conglomeration of two forms.

“In the 12th Edition of Linnæus two Boobies are named—*Pelecanus piscator* and *P. sula*. The first of these names is now obviously restricted to the Red-footed Booby. The plumage is described as white, and the first reference is to the so-called female in Osbeck’s description and to Brisson’s *Sula candida*, which is also undoubtedly the same species.

“With regard to Linnæus’ *Pelecanus sula*, it does not seem possible to identify it with the Brown Booby, as the face and legs are described as red. And although there is a reference to Brisson’s ‘*Sula sula*,’ one must go by the diagnosis and not by the reference, and this name must be regarded as a doubtful synonym of *Sula piscator*. The next available name for the Brown Booby appears to be Boddaert’s *Pelecanus leucogaster* (*Pl. Enl.* 1783, p. 57, No. 973) as was first pointed out by Nelson (*Proc. Biol. Soc. Washington*, XVIII., 1905, p. 121). This name is founded on Buffon’s Petit Fou (*Hist. Nat. Ois.*, Vol. VIII., 1781, p. 374), and is figured as the ‘Fou de Cayenne’ in the *Planches Enluminées*. The type, therefore, of the genus *Sula* is *Sula leucogastra* (Bodd.).”

Under the succeeding species I give a detailed account of the Linnean species *P. piscator* and *sula*, and would point out that my account was prepared and in the printers’ hands before Mr. Sclater commenced his inquiry. It will be seen that I also reject *Pelecanus piscator* Linné as an unidentifiable mixture, but I see nothing in Osbeck’s account that can be referred to the Brown Booby, as Mr. Sclater indicates. Linné’s later readjustment of his *P. piscator* is untenable, so that that name must be dismissed from further consideration. Linné’s *Pelecanus sula* depends upon the diagnosis, not the references, as Mr. Sclater rightly concludes. When Mr. Sclater wrote: “this name must be regarded as a doubtful synonym of *Sula piscator*” he apparently meant “of the 12th Edition.” I have also arrived at the same conclusion, but I regard it as absolutely synonymous and not doubtfully.

PISCATRIX.

Consequently, it becomes the correct name for *piscator* Auct. = *piscator* Linné, XIIth Edition, not *piscator* Linné, Xth Edition.

Sclater's acceptance of Boddaert's name *leucogaster* for the Brown Booby is in agreement with American writers, and Rothschild and Hartert, myself and various British and Continental and Colonial writers commonly since 1905.

Sclater's determination of Brisson's *Sula* as the Brown Booby necessitates a readjustment of the group names to be used. The previous account was prepared with "*piscator*" Auct. as type of *Sula*, and I have altered the nomination only.

Piscatrix Reichenbach becomes the genus name for the Linnean *Pelecanus sula* and *Sula* Brisson, the genus name (vice *Hemisula mihi*), for Boddaert's *Pelecanus leucogaster*.

The anomalous combinations *Piscatrix sula* Linné and *Sula leucogaster* Boddaert remind one of the similar incongruous nomenclature observed among the Owls, where we have or had, *Asio otus*, *Otus asio*, *Strix aluco*, and *Aluco flammea*.

In the present case we see a little charm in the phylogenetic relationship suggested by study of the forms and the new combinations. Thus I suggest that *Piscatrix* is more specialised than *Sula*, as the immature of *Piscatrix* bears a close resemblance to the immature of *Sula*; the adult of *Sula* has, however, developed on the same lines as the immature, while *Piscatrix* has discarded the garb of the juvenile for a beautiful snowy plumage.

Consequently *Sula* would represent the generalised stage of the Suline group, of which *Piscatrix* is a highly specialised offshoot.

On p. 157, line 7 from the bottom, for *Sula* Brisson read *Piscatrix* Reichenbach. On p. 159, line 4 from the top, for *Hemisula* read *Sula* Brisson.

PISCATRIX SULA RUBRIPES.

AUSTRALIAN RED-LEGGED GANNET.

(PLATE 225.)*

SULA RUBRIPES Gould, Synops. Birds Austr., pt. iv., App., p. 7, 1838; New South Wales (errore) = Raine Island, Queensland.

Sula rubripes Gould, Synops. Birds Austr., pt. iv., App., p. 7, 1838; *id.*, Proc. Zool. Soc. (Lond.) 1837, p. 156, 1838; Gray, List Birds Brit. Mus., pt. iii., p. 183, 1844; Stone, Austral Av. Rec., Vol. I., p. 144, 1913.

Sula piscator Gould, Birds Austr., Vol. VII., pl. 79, 1846; Reichenbach, Synops. Av. Natat., pl. 53, fig. 853, 1850; Gould, Handb. Birds Austr., Vol. II., p. 509, 1865; Gray, Handl. Gen. Sp. Birds, pt. iii., p. 126, 1871; Ramsay, Proc. Linn. Soc. N.S.W., Vol. II., p. 203, 1878; Selater and Salvin, Zool. Chall. Rep., Vol. II., p. 120; Layard, Ibis 1880, p. 233; *id.*, *ib.*, 1881, p. 134; Salvadori, Orn. Papua e. Moll., Vol. III., p. 419, 1882; Ramsay, Tab. List Austr. Birds, p. 24, 1888; Ogilvie-Grant, Cat. Birds Brit. Mus., Vol. XXVI., p. 432, 1898; Hall, Key Birds Austr., p. 102, 1899; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 987, 1901; Hall, Key Birds Austr., 2nd ed., p. 102, 1906.

Piscatrix candida Reichenbach, Nat. Syst. Vögel, p. vi., 1852 (part); Bonaparte, Consp. Gen. Av., Vol. II., p. 166, 1856.

Sula piscatrix Mathews, Handl. Birds Austral., p. 38, 1908; Macgillivray, Emu, Vol. X., p. 224, pl. xxviii., 1910; *id.*, *ib.*, Vol. XIII., p. 148, 1914; North, Austr. Mus. Spec. Cat., no. 1, Vol. III., p. 347, 1912.

Sula piscator piscator Mathews, Nov. Zool., Vol. XVIII., p. 242, 1912.

Sula piscator rubripes Mathews, List Birds Austr., p. 98, 1913.

DISTRIBUTION.—Queensland. Extra-limital.

Adult female. General colour above and below white tinged with buff; greater upper wing-coverts, bastard-wing, primary-coverts and quills hoary grey, inner webs of quills paler and becoming white towards the base on the secondaries; under wing-coverts white with the exception of the median and greater series which are for the most part grey. "Bill greyish-black shading to pink at base; naked skin round the eye blue; gular pouch black; line across the fore-head and running along the line of the upper mandible to the gape pink; eye grey and white; feet rose colour" (Macgillivray). Total length 710 mm.; culmen 83, wing 392, tail 230, tarsus 40.

* The Plate is lettered *Sula rubripes*.



H. Grönvold. del.

Witherby & Co

$\frac{1}{3}$
SULA RUBRIPES.
(RED-LEGGED GANNET).

AUSTRALIAN RED-LEGGED GANNET.

Adult male. Similar to the adult female.

Nest. A platform of sticks about 8 to 12 inches across, with the depression in the centre about one inch (Macgillivray).

Eggs. Clutch one; ground colour bluish-white, covered with lime. Axis 56-58 mm.; diameter 38-40.

Breeding-season. May and July to September (Macgillivray).

REGARDING this bird Gould said he would have liked to retain his name of *rubripes*, "*did not the law of priority demand that it should be otherwise.*" Of course Gould was a great upholder of the law of priority, and I am pleased to be able to use his name for the Australian form of this species.

The only observations made in connection with this bird in Australian waters seem to be due to the Macgillivrays (at an interval of sixty odd years) at the same place.

Gould gave the following account: "I am . . . indebted to Mr. Macgillivray for the following notes, as well as for a carefully executed diagram of the bill and face, by means of which I have been enabled to colour the soft parts correctly. 'With the exception,' says Mr. Macgillivray, 'of one bird which perched on the rigging, and was caught while at sea in the neighbourhood of the Keeling Islands, we found this species only on Raine's Islet, a vegetated sand-bank in the line of the Great Barrier Reef. When we landed there on the 29th of May, it appeared to me that the breeding-season was then over, but I was fortunate enough to find a solitary bird sitting upon its nest, which contained a single egg. The nest consisted of a few roots of a creeper common on the island, forming a platform eighteen inches in diameter laid upon a tuft of herbage. A few days after this the Gannets, having been much molested, entirely deserted the island during the day, returning at night in a body of several hundreds, to roost on the ground and low bushes near the centre of the island.' Mr. Macgillivray observed that the colouring of the bill and soft parts also varies with the age of the individual; in the first stage the bill is of a delicate bluish-pink, the pink tint predominating at the base of the upper mandible, the bare patch about the eye of a dull leaden hue, the pouch flesh-coloured; in the second, the colouring of these parts is similar but somewhat brighter, and ultimately the irides become grey, and the legs and feet vermillion."

Macgillivray, the elder, was at Raine Island in 1844-5 and no further observations seem to have been made until Macgillivray, the younger, visited Raine Island in 1910 and gave the following account:

Sula piscatrix Macgillivray, *Emu*, Vol. X., p. 225, 1910; Raine Island. "The Red-legged Gannet nests in groups in different parts of the island.

THE BIRDS OF AUSTRALIA.

All of the nests are placed on the horizontal shrubby growth, and are a clear foot or more from the ground. The nest consists of a substantial interwoven platform of sticks, about 8 to 12 inches in diameter, depressed to about an inch in the centre for the reception of the single egg. The great majority (October 30) are occupied by fully-fledged young birds, most of them just ready to fly. Many have left the nest, and are roosting on the shrubby growth round the old nests. There are very few small young birds, and still fewer eggs. The young are hatched out blind, with pale leaden-coloured skin, and with only an indication of down, distributed in the same way as in the other species, but with a very dark and shorter bill and dark mask, and this, instead of getting lighter as the bird grows older, gets darker, the bill and face of the fully-feathered young being almost black. The down on the nestling is also darker than in the other two kinds, and the fully-feathered young bird is of a dirty grey general colour, especially on the head, back, breast and abdomen, which is white in the adult. The bill and mask in the adult is creamy-white, with red border above the eyes and under the chin, and red legs. The legs of the mature young are leaden, with a tinge of pink. We find two adults, sitting on small young, with the bill and mask as in a mature adult, but with the general feathering of immaturity, leading us to believe that these birds do not attain to their mature plumage until two years at least have elapsed, and that they breed during the stage of immaturity. We cannot make this species leave their nests when sitting upon newly-hatched young."

Macgillivray (*Emu*, Vol. XIII., p. 148, 1914) adds: "On Raine Island, on 10th July, 1911, several nests with one egg in each and a few with one young bird. Great numbers of the birds were building."

The bird figured and described is a female collected on Raine Island, North Queensland, on 12th July, 1911, by Dr. W. Macgillivray, who gave it me.

In the *Catalogue of the Birds in the British Museum*, Vol. XXVI., p. 432, 1898, Ogilvie-Grant used for this bird the name *Sula piscator*, basing it upon Linné's (*Syst. Nat.*, 12th ed., p. 217, 1766) *Pelecanus piscator*.

In the American Ornithologists' Union's *Checklist*, 3rd ed., 1910, p. 61, the same name is used, the reference reading: "*Pelecanus piscator* Linnæus, *Syst. Nat.*, ed. 10, 1, 1758, 134 (China Sea)." I corrected the type locality to "Java Seas" in the *Nov. Zool.*, Vol. XVIII., p. 242, 1912.

I have now investigated this and give the details here so that the reader can follow the facts, the majority of the works consulted being rare.

Linné wrote (*Syst. Nat.*, 10th ed., p. 134, 1758):

"*Pelecanus piscator*. P. cauda cuneiformi, rostro serrato, remigibus omnibus nigris. Chin. Lagerstr. 8. Osb. iter 85.

AUSTRALIAN RED-LEGGED GANNET.

"*Anæthetus major melinus subtus albidus, rostro serrato dentato.* Brown, jam, 481.

"*Anseri bassano affinis* Catesb., car. 1, p. 87, t. 87.

"Sloan jam 2, p. 322, t. 271, f. 2. Raj. av. 191.

"Habitat in India utraque, Europa.

"Alter sexus albus remigibus nigris, alterniger abdomine canescente. Osbeck.

"Mandibula superior versus basin margine quasi dente utrinque mutilata. Nares clausæ. Remiges in albo primores nigræ; secundariæ albæ, sed apicibus extrorsum nigræ."

As far as the description is concerned it is incorrect, as the phrase "remigibus omnibus nigris" does *not* apply to the bird recognised above as "*piscator*."

Ogilvie-Grant gives in his Key as the character of the species (*l.c.*, p. 424): "Outer webs of flight-feathers hoary-grey," and on p. 433 emphasizes this by writing: "This species may be recognized in all stages of plumage by the hoary-grey appearance on the outer webs of the quills."

Such a discrepancy might appear of little account and be ignored were it not that there is a Gannet showing the character "remigibus omnibus nigris."

Linné's description depends first upon the references "Chin. Lagerstr. 8. Osbeck, iter 85." As the former may give trouble to other investigators as it did to me, I might record that this is the title of a paper included in the *Amoen Acad.*, and that this was not published until 1759. The *Amoen Acad.* consists of theses presented at the University of Upsala, where Linné was professor, and hence his inclusion but without pagination, as he had the paper to read. The second reference, however, is available and consists of the same matter that is included in the Chin. Lagers.

Peter Osbeck, one of Linné's pupils, travelled to China, and in his *Dagboek Ostindisk Resa* which appeared in 1757, on p. 85 he described *Diomedea piscatoria* Masc. and Femina, procured on July 13th, 1751, a day's sail this side of Java.

Forster published an English translation in 1771, and from Vol. I., p. 127, I give the account of this bird: "It was the male of the *Pelecanus piscator* Linn. Its bill is pointed, elevated, narrow, blueish on the outside, has a serrated margin, and is two palms long; the throat and all about its eyes are without feathers, and covered, as the bill, with a blueish skin; the upper jaw is elevated, and has on both sides a furrow running towards the point, which is bent, and has a prominence; near the head the bill has an elevated part; the lower jaw is narrow and straight; the tongue which is fastened to it is arrow-shaped; the cere is light blue; the nostrils are

THE BIRDS OF AUSTRALIA.

wanting, unless the notch at the base of the bill can be taken for them; the pupils of the eyes are black: their irides are white and surrounded with black; the head, the neck, back, the upper side of the wing, and the inner margin thereof, together with the tail are quite black; the breast, the belly, and the uropygium are white, waved with blackish-grey; the down and the lower coverts of the wings, in particular the ten longest and innermost, are white; all the sixty-four quill feathers are very black, with whitish-grey below; the first quill-feather is the longest, the next to it decrease gradually; there are ten quill feathers on the first joint, on the second thirty, on the third or innermost fourteen; and more secondary feathers. The upper-coverts are tipped with grey; the lower are dirty white, with little black edges; the tail has fourteen feathers; the thighs are covered with grey feathers; the legs naked and whitish, like the four toes; the first toe has five, the second four, the third three, and the fourth two joints; no back toe is to be met with; the heart is oval: the liver is long. The bird is the size of a raven. The female is somewhat less: the bill is more serrated and reddish towards the head; the neck and the upper-coverts of the wing are white; the three first quill feathers are quite black, as in the male; the next following ones are grey, spotted, and the last white, mixed with black; the back, the coverts of the wings, and the thirteen feathers of the tail are white, spotted with reddish-yellow; the middlemost feather in the tail is the longest; the toes and legs are red; the rest the same with the male. Whether this is the female of the first described bird, I leave to others to examine. It may be compared with the *Anser bassanus* of Albin, Vol. I., p. 86."

On p. 293, having arrived back at Ascension Island in 1752, Osbeck wrote (to quote again Forster's translation, Vol. II., p. 89): "*Diomedea adscensionis* was caught here. It was entirely white, not even the thirteen feathers of the tail excepted; had red feet, formed chiefly for swimming, and only black tips to its wings; for the rest, it is like the *Diomedea piscatoria* (*Pelecanus piscator*) which is likewise to be met with here."

Consideration of the preceding compels me to dismiss Osbeck's male bird as indeterminable, as I cannot see how the present bird can be compared as "quite black" and "all the sixty-four quill feathers are very black." I would also note "the female is somewhat less." The description of the female applies closely to this bird, but then the female is a larger bird than the male; consequently the description of the male *must* have been drawn up from another species of Gannet. The type locality must be "Java Seas," and from Christmas Island, Indian Ocean, almost the type locality, three species of Gannets were brought back by Mr. (now Dr.) C. W. Andrews, F.R.S., of the British Museum, namely *Sula sula* (recte *Sula leucogaster* Boddaert), *Sula*

AUSTRALIAN RED-LEGGED GANNET.

abbotti and *Sula piscatrix* (recte *Sula sula*). The second named species *Sula abbotti* is a larger bird than *Sula sula*, the present species, and has "very black" primaries. It is quite possible that this is the bird described by Osbeck, and consequently *Pelecanus piscator* Linné must be regarded as a mixture and disused in any connection. Before leaving this subject, Linné's synonymy of his species may be examined, as it might throw light upon the validity of the species.

The first reference is to Browne's Jamaica. Upon looking this up I find no description worth consideration, Browne writing: "Varies much in its colour, which most frequently borders upon the yellowish." Browne's work was published in 1756 and he refers back, as he gives no figure, to Sloane and Catesby.

Catesby in his *Natural History of Carolina* in 1731 gives a full description, where he notes variation, but adds a splendid figure which is easily recognisable as the bird known as *Pelecanus leucogaster* Boddaert.

Catesby gives a reference to Sloane's Jamaica 1725, and there at the place quoted by Linné I find no description, but the plate figures again *Pelecanus leucogaster* Boddaert.

Ray, the only other authority cited by Linné, in 1713, p. 191, gives no figure and his description reads: "Albo et cinereo colore varia est: Anaitis Moscoviticæ magnitudine." Thus of Linné's four synonyms two are quite meaningless, while the other two refer to *Pelecanus leucogaster* Boddaert. Consequently this supports strongly my contention that *Pelecanus piscator* Linné cannot be used for any species, apparently three or more species being confused under that name.

Linné himself recognised this fact, for in his twelfth edition, p. 217, he included *Pelecanus piscator*, but restricted it to the "*Amoen Acad.* 4, p. 239 femina, *Diomedea piscatoria* femina, Osb. it. 86, and *Sula candida* Briss. av. 6, p. 501." The first reference is to the published account, cited in 1758 as "Chin. Lagerstr. 8," then only in MS. The last named is quite a good reference to the present species, the description, as usual with most of Brisson's, being full and accurate.

On p. 218, ed. XII., Linné described *Pelecanus sula* thus:

"P. cauda cuneiformi, corpore albido, rostro dentato, remigibus primoribus apice nigricantibus, facie rubra. Habitat in Pelago indico.

"Bassano dimidio minor. Facies nuda, rubra. Pedes rubri. Mandibula superior magis apice adunca. Remigibus non tantum primores, sed et secundariæ extrorsum nigricantes. Rectrices que apice fuscescentes."

To this Linné added the synonymy he rejected from his *P. piscator*, with the only addition of "*Sula*" Briss. av. 6, p. 495, which is not referable here.

THE BIRDS OF AUSTRALIA.

The synonyms given by Linné do not agree in any way with his description, all belonging to either *P. leucogaster* Boddaert, or being indeterminable as shown above.

Apparently no one read the description but simply looked at the figures until Nelson did (*Proceedings Biol. Soc. Wash.*, Vol. XVIII., p. 121, 1905), as this name was used for *Pelecanus leucogaster* Boddaert, to which no word of Linné's description applies, while it is an accurate one of the present species. Why Ogilvie-Grant used it I cannot say, as he rejected *Sula fiber* Linné, a name commonly in use for *P. leucogaster* Boddaert, recognising that as the immature of what he called "*piscator*," suggesting that he had studied Linné's description. In the present case it is very obvious that he used a name to displace an incorrect one without making any attempt to see what the displacing name referred to.

The rejection of Linné's *P. piscator* of the 10th Edition is therefore inevitable, but it is pleasing to find such an excellent substitute in his *P. sula* of the 12th Edition. We have no idea of the type locality of Linné's bird, as "Habitat in Pelago indico" meant nothing in Linné's usage. None of the synonyms help, so that an arbitrary selection must be made. We cannot use "Java Sea," as Osbeck's bird is made the basis of the *P. piscator* of the twelfth. I suggest therefore that the description given by Linné fits the other bird noted by Osbeck as *Diomedea adscensionis*, and that it is based on Osbeck's specimen. I therefore designate Ascension Island, Atlantic Ocean, as the type locality of *Pelecanus sula* Linné, *Syst. Nat.*, 12th Ed., p. 218, 1766.

The Pacific Ocean birds are larger in every dimension than Atlantic birds, and the soft parts seem to differ, but no series are available with full data showing local variation in this respect.

GENUS—SULITA.

- SULITA Mathews, Austral Av. Rec., Vol. II., p. 123, 1915 .. Type *S. bassana*.
Morus Vieillot, Analyse nouv. Ornith., p. 63, 1816 .. Type *S. bassana*.
 (Not *Morum* Bolten, 1798.)
Moris Forster, Synopt. Cat. Brit. Birds, p. 59, 1817 .. Type *S. bassana*.
 (NOTE: Mis-spelling of *Morus* only.)
Plancus Reichenbach, Nat. Syst. Vögel. p. vi., 1852 .. Type *S. bassana*.
 (Not *Plancus* Curtis 1833.)

Also spelt—

Plaucus Ogilvie-Grant, Cat. Birds Brit. Mus., Vol. XXVI., p. 423, 1898.

LARGEST Suline birds with long Suline bill, medium thick neck, long wings, stout body, long tail, short legs and long toes, toti-palmate.

The bill is long, longer than the head, straight not hooked, but slightly bent at the tip which is sharp: bill rather broad at the base, but laterally compressed anteriorly, the culmen ridge flattened and separated from the laterals by a deep linear groove extending the whole length of the bill and showing no nostrils in the adult stage. The edges of the mandibles are finely serrated: the rami of the lower mandible strong and deep, enclosing a very narrow triangular *unfeathered tract, which extends linearly a short way down the throat*. In front of the eyes and below, bordering the gape, bare skin is present, but the cheeks and chin, save for the narrow strip above mentioned, are feathered. The neck is of medium length and thick.

The wing is long, with pointed feathers scalloped towards their tips, the first primary longest, the remainder rather rapidly shortening.

The tail is long, about half the length of the wing and more than twice the length of the culmen: it is composed of twelve feathers, being wedge-shaped, the two middle feathers very pointed.

The legs are short, but comparatively long and slender; the metatarsus is more than half the length of the culmen. The metatarsal covering is very peculiar, as fully described and figured in connection with the preceding genus. It should be noted that the hind toe is very short in comparison with the hind toe of the previous genus and the covering is exactly the opposite. Thus, whereas the three front toes are very regularly covered with scutes, the hind toe shows a reticulate face. In the genus *Sula* the three

THE BIRDS OF AUSTRALIA.

front toes are reticulately covered, whereas the hind toe shows fairly regular scutes. The figure given obviates a detailed description, and the discussion given under the preceding genus shows the great distinction between this and the previous genus. The nestling with egg-tooth still present on the culmen has the leg-covering as seen in the adult.

I have given a new name to this genus, as *Morus* may be considered invalid on account of the prior *Morum*, and *Moris* is simply a mis-spelling, as Klein called the bird *Plancus morus*, and both Forster's and Vieillot's names are taken from that origin. Forster simply used Leach's name, and Leach is the author of so many mis-spellings that it becomes certain this is another one.



H. Grönvold, del.

Witherby & Co.

$\frac{1}{4}$
SULA SERRATOR.
(AUSTRALIAN GANNET).

SULITA SERRATOR DYOTTI.

AUSTRALIAN GANNET.

(PLATE 226.)*

SULA SERRATOR DYOTTI Mathews, Austral Avian Record, Vol. II., p. 63, 1913 ; Tasmania.

Sula australis (not Stephens 1826) Gould, Proc. Zool. Soc. (Lond.) 1840, p. 177 : Tasmanian Seas ; Gray, in "Dieffenbach's Travels in New Zeal.," Vol. II., App., p. 200, 1843 (part) ; *id.*, List Birds Brit. Mus., pt. III., p. 183, 1844 ; Gould, Birds Austr., Vol. VII., pl. 76, 1846 ; Reichenbach, Synops. Natatores, pl. 54, Nos. 2287-8, 1850 ; Layard, Ibis 1863, p. 246 ; Gould, Handb. Birds Austr., Vol. II., p. 504, 1865 ; Witmer Stone, Austral Av. Rec., Vol. I., p. 144, 1913 ; Agnew, Emu, Vol. XIII., p. 94, 1913.

Sula serrator (not Gray 1843) Bonaparte, Consp. Gen. Av., Vol. II., p. 166, 1856 ; Schlegel, Mus. Pays-Bas, Vol. VI., Pelec., p. 38, 1863 ; Gray, Handl. Gen. Sp. Birds, pt. III., p. 126, 1871 ; Ramsay, Proc. Linn. Soc. N.S.W., Vol. II., p. 203, 1878 ; Legge, Papers and Proc. Roy. Soc. Tasm., 1886, p. 244, 1887 ; *id.*, *ib.*, 1887, p. 96, 1888 ; Ramsay, Tab. List Austr. Birds, p. 24, 1888 ; North, Austr. Mus. Cat., no. 12, p. 363, 1890 ; Ogilvie-Grant, Cat. Birds Brit. Mus., Vol. XXVI., p. 428, 1898 (part) ; Hall, Key Birds Austr., p. 102, 1899 ; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 981, 1901 ; Hill, Emu, Vol. II., p. 167, 1903 ; Carter, *ib.*, Vol. III., p. 211, 1904 ; Hall, Key Birds Austr., 2nd ed., p. 102, 1906 ; Sharpe, Hist. Coll. Nat. Hist. Brit. Mus., Vol. II., p. 154, 1906 ; Mathews, Handl. Birds Austral., p. 38, 1908 ; Mattingley, Vict. Nat., Vol. XXV., p. 20, 1908 ; Cole, Emu, Vol. VIII., p. 78, 1908 ; White, *ib.*, p. 202, pl. xvii., 1909 ; Hill, *ib.*, p. 223, 1909 ; Littler, *ib.*, Vol. IX., p. 147, 1910 ; *id.*, Handb. Birds Tasm., p. 201 ; White, Emu, Vol. XI., p. 35, 1911 ; North, Austr. Mus. Spec. Cat., no. 1, Vol. III., p. 339, 1912 ; White, Emu, Vol. XII., p. 161, 1913.

Sula sula (not Linné) Dove, Emu, Vol. V., p. 159, 1906.

Sula bassana serrator Mathews, Nov. Zool., Vol. XVIII., p. 241, 1912.

Sula serrator dyotti Mathews, Austral Av. Rec., Vol. II., p. 63, 1913.

Sula serrator serrator Mathews, *ib.*

Morus serrator dyotti Mathews, List Birds Austr., p. 98, 1913.

* The Plate is lettered *Sula serrator*.

THE BIRDS OF AUSTRALIA.

RANGE. New South Wales ; Victoria ; Tasmania ; South Australia ; West Australia.

Adult male. General colour above and below pure white ; crown of head, sides of face, and upper hind-neck golden buff ; bastard-wing, primary-coverts and quills dark greyish-brown, paler and more hoary grey on the inner webs of the quills : the latter have white shafts towards the base ; the four middle tail-feathers greyish-brown with white shafts, remainder of tail white. Bill slate, bare skin on the face slate-blue : iris silver-grey, feet dull greenish-black with the toes light green. Total length 980 mm. ; culmen 89, wing 470, tail 240, tarsus 60.

Adult female. Similar to the adult male.

Immature. General colour above greyish-brown, all the feathers tipped with white, wedge-shaped on the back, scapulars, wing-coverts, head, and hind neck, and edged with white at the tips of the primary-quills ; under-surface for the most part white, with some brown feathers on the throat, fore-neck, and thighs.

Nestling. Covered with white down.

Nest. Composed on the ground, shaped like a flat cone from 4 to 6 inches high. Egg cavity from 6 to 8 inches by one to two deep.

Eggs. Clutch, one ; lime covered. Axis 78 to 82 mm. ; diameter 49-50.

Breeding-season. October to January.

THIS fine bird, the Australian representative of the "Bird with a History" of European fame, seems to have little recorded history.

Mr. J. W. Mellor has written me : "This Gannet is seen in fair numbers along the coast of South Australia, but does not care so much for the small inlets, keeping more to the open and rougher seas. I have noted it along the southern shores of Kangaroo Island, and also in Spencer's Gulf from Port Lincoln upwards. The greatest sight that I ever saw in connection with the breeding of these birds was on Cat Island, near Babel Island in Bass Straits, while on the Royal Australasian Ornithologists' Union's 8th Congress Expedition in the S.S. 'Manawatu.' An extract from my diary reads : 'Dec. 4, 1908. We weighed anchor at 5 a.m., and steamed north to the end of Flinders Island where we left a party of nine to investigate Flinders Island in this locality ; the steamer then rounded Flinders Island, and steamed south to Cat Island, where we cast anchor at noon, and after lunch the whole party landed to view the Gannet rookery, where the birds covered about an acre of ground. The birds were sitting on their nests, which were placed thickly over the whole of the area ; many nests contained large young, while others had eggs in all stages of incubation. The sight of this vast horde of bird life was truly inspiring, as it was estimated that 8,000 to 10,000 birds were breeding here. The birds were extremely tame, allowing us to go amongst them without flying off their nests. The clutch was one egg ; the nests were small mounds of dirt and excreta, which had accumulated for years, as the place had apparently been used for ages by the birds. The silver gulls were about amongst the gannets, and were quick to spy an unprotected

AUSTRALIAN GANNET.

egg or small young, and would dart down on it in an instant, and start to destroy it, as they do to other sea-birds not of their own species. The peculiar manner in which the birds "change sittings" was watched with interest: a bird would come in from the sea, and after circling round a few times, would settle in the rookery near to where its mate was on the nest: it would then approach the sitting bird, and after cooing for some time and stretching out its neck, would start caressing by placing its bill first on one side of the sitting bird and then on the other. This crossing of necks kept on for quite a few minutes, all the while the incoming bird getting closer and closer to the breast of the sitting one; then the last named would gradually back off the nest, and the relieving bird get on, so that the egg or young was not exposed for a moment, and the robber gulls were not permitted to see for an instant the offspring. The gulls are nevertheless good as scavengers, as they pick up and fly off with the superfluous fish that are brought in for the young gannets, and which would soon decompose in the hot sun and make the locality uninhabitable. The food of the young gannet we noted consisted principally of fish, some quite a foot long. In catching the fish, the gannet employs the same tactics as the tern; mounting above its prey, the bird comes down head first, the sharp bill cleaving the surface of the water and allowing the heavy body to go beneath the surface with a mighty splash, and in a moment or two the gannet emerges with its prey in its bill.' "

Mr. H. Stuart Dove in a letter dated January 30th, 1912, wrote: "There has been a very large concourse of this species on the North-West Coast of Tasmania during the present month. On the 5th, hundreds were observed diving into the sea near the Mersey training-wall—diving, as noted some six years, during the afternoon and evening until about 7.30." Mr. Dove's note here follows:

"*Sula sula* (not Linné) Dove, *Emu*, Vol. V., p. 159, 1906. It is very interesting to watch the diving operations of the Gannet (*Sula sula*) especially when conducted on so large a scale as has been the case recently on this coast. A great shoal of the delicate little fish called whitebait has made its appearance in our waters, and hundreds of bird pursuers are relentlessly following it up. Yesterday afternoon I counted 63 Gannets in one group floating on the blue waters of the Mersey, just where it debouches into the Strait, enjoying in the sunshine a brief spell from their fishing labours. Although I have repeatedly watched the Gannets diving off the coast of New South Wales and elsewhere, I never remember seeing them present in such numbers as here just now. When over a good shoal of fish they literally tumble by dozens and scores into the water, reminding the watcher of a

THE BIRDS OF AUSTRALIA.

shower of huge snowflakes melting into the waves; it is marvellous how they avoid striking each other when descending in such numbers and with such velocity into a small patch of water, each apparently oblivious of everything except that one little object it has sighted beneath the surface. The dive into deep water is usually made from a height of 18 to 30 feet, and is a literal 'header,' the bird usually entering the waves nearly vertically, and with a splash; a perceptible interval elapses before it reappears some little distance away, giving its yellowish beak a swish backwards and forwards after swallowing its prey. It usually sits a few seconds upon the water before going aloft again, thus differing from the Tern, which takes to its wings the moment it reaches the surface. When diving in shallow water close to the rocks, the Gannet begins the descent from a height of 4 or 5 feet only, instead of 20 or 30 feet. The wings are not closed, as is usually supposed, at the beginning of the descent, but remain expanded until the bird is close to the surface, and apparently assist in guiding it to the exact spot which it desires to reach; it then flaps them suddenly to the side of the body, and the admirable adaptability of its shape to its aquatic life may be well seen just as it enters the water, the long beak, head, neck, and body stretched out rigidly in one straight line, the legs and wings tucked closely in, everything arranged so as to offer as little resistance as possible to the water. Few prettier sights can be imagined than a company thus engaged in diving on a spring afternoon, with the sunshine above and the blue waves beneath: the plunge is made with such zeal (there are no half-measures about the bird's dive)."

McClymont, in the *Emu*, Vol. III., p. 56, 1903, noted: "On the 17th of October, 1902, one Gannet was diving in the estuary of the Derwent. . . . The dive of the Gannet (as far as the eye can judge) is taken vertically, or very nearly so. As a rule the wings remain expanded until the bird reaches (or almost reaches) the water. But occasionally the wings are closed for an instant at some height above the water—perhaps in order to accelerate the speed by reducing the extent of surface to which the air offers resistance. The foregoing remarks apply to dives taken from a height of about 15 feet and over. When they are taken from a lower elevation the course is frequently an oblique one."

In Campbell's *Nests and Eggs* there is another account by J. C. Gabriel of the Gannet rookery on Cat Island. It covers the same details as Mellor's given above, but Gabriel writes: "We found between 2,400 and 2,600 birds (roughly estimated by measuring) seated in the locality on their nests." If Mellor's area of "an acre" is anywhere near correct, then Gabriel's number is more likely to be accurate than Mellor's guess.

AUSTRALIAN GANNET.

Little else regarding its habits appears to have been written.

Mr. Tom Carter found an old bird dead on the beach as far north as Point Cloates on the 30th of September, 1911: iris yellow, bill greenish-grey, legs and feet purplish with green stripes down tarsus and toes.

The bird figured and described is a male, collected in Tasmania on December 10th, 1909, by Mr. Dyott, who very kindly gave me the skin and after whom the bird is named.

This Gannet so closely resembles the European bird that superficially the only distinction is in the tail: the European bird, when adult, having the tail pure white, the Australian one having the four middle tail-feathers brown, the remainder white. The narrow strip of naked skin down the throat is of about the same length. In South Africa a similar Gannet is found, but the tail is wholly brownish-black, and the naked strip extends about six inches down the throat. These three may be considered distinct species, but they are so nearly related that I at one time considered them subspecies only.

They constitute quite a distinct group, all three species agreeing in the peculiar metatarsal and toe-covering and feathered cheeks and chin. This group, when contrasted with the whole of the remaining Gannets, must be considered as of generic value.

The New Zealand bird was named by Gray, a few years after Gould had described the Australian bird under a pre-occupied name, and Gray's name has been commonly used for both the Neozelanic and Australian birds.

I find the latter never get the coloring on the head and neck of such a deep shade as the former, and therefore are subspecifically separable.

The forms of the genus I would recognise may be named thus:

Sulita bassana (Linné).

“Coasts of North Atlantic.”

Sulita capensis (Lichtenstein).

South Africa.

Sulita serrator serrator (Gray).

New Zealand.

Sulita serrator dyotti (Mathews).

Australia.

Sula australis Gould (not Stephens 1826) 1841 is a synonym.

I had nearly overlooked the fact that though this bird has no history it was figured in the Watling Drawings No. 293.

Watling noted: “One-fourth the size of nature. Native name *Doo-ro-dang*.” No mention of this is made in the *Supplement to the General Synopsis*, where Latham dealt with the birds figured by Watling, but in the

THE BIRDS OF AUSTRALIA.

Gen. History of Birds, Vol. X., p. 438, 1824, is a note under Lesser Gannet, which reads as follows: "The Lesser Gannet is also found in New Holland, and called by the natives *Doo-ro-dang*."

Latham's Lesser Gannet of the *Synopsis*, Vol. III., pt. II., p. 611, was, however, *Pelecanus sula* of Linné. On p. 609, under the Common Gannet, Latham had noted: "Said also to have been met with frequently by our several voyagers in many parts of the *southern* ocean; but we are not clear whether the sort meant by them is the *Common Gannet* here treated of, or the lesser one, below described."

GENUS—P A R A S U L A .

PARASULA Mathews, Austral Avian Record, Vol. II.,

p. 55, 1913 Type *P. dactylatra*.

LARGE Suline birds with long bill, medium thick neck, long wings, long tail, stout short legs and long toes, toti-palmate; the base of the jaws and chin naked, but no naked strip down centre of throat.

In general structural characters this genus agrees with the preceding, differing in the naked bases of the jaws and chin, different proportions of wings, tail, culmen, etc., different number of tail-feathers and the metatarsal and toe-covering.

The culmen is longer than the head, more than half the length of the wing, but less than twice the length of the metatarsus.

The tail is wedge-shaped, consisting of sixteen feathers, the central feathers broader, the outside ones not so short as in *Sulita*, and the length less than half that of the wing.

The legs are short and stout and more than half the length of the culmen; the metatarsus coarsely reticulate on the front and sides, smaller scales behind, but the scales not so fine as in the preceding genus; the toe-covering consists of reticulations which can be traced in the juveniles as scutes irregularly broken up, but even in the downy young no regular scutes are preserved. The toes are long, the middle claw strongly pectinated.

This genus has a tropical distribution and would probably claim nearer relationship to *Sulita* than either *Piscatrix* or *Sula*. This should demand the attention of future investigators.

PARASULA DACTYLATRA PERSONATA.

AUSTRALIAN MASKED GANNET.

(PLATE 227.)*

SULA PERSONATA Gould, Proc. Zool. Soc. (Lond.) 1846, p. 21; Raine Island, North-east Australia.

Sula personata Gould, Proc. Zool. Soc. (Lond.) 1846, p. 21; *id.*, Birds Austr., Vol. VII., pl. 77, 1846; Reichenbach, Synops. Natatores, pl. 54, fig. 2291, 1850; Macgillivray, Narr. Voy. "Rattlesnake," Vol. II., p. 359, 1852; Witmer Stone, Austral Av. Rec., Vol. I., p. 144, 1913.

Sula cyanops (not Sundevall) Bonaparte, Consp. Gen. Av., Vol. II., p. 166, 1856; Schlegel, Mus. Pays-Bas., Vol. VI., Pelec., p. 39, 1863; Gould, Handb. Birds Austr., Vol. II., p. 506, 1865; Gray, Handl. Gen. Sp. Birds, pt. III., p. 126, 1871 (part); Masters, Proc. Linn. Soc., N.S.W., Vol. I., p. 64, 1876; Ramsay, Tab. List Austr. Birds, p. 24, 1888; North, Austr. Mus. Cat., no. 12, p. 379, 1890; Ogilvie-Grant, Cat. Birds Brit. Mus., Vol. XXVI., p. 430, 1898 (part); Hall, Key Birds Austr., p. 102, 1899; Campbell, Nests and Eggs Austr. Birds, p. 985, 1901; Tunny, Emu, Vol. I., p. 73, pl. ii., 1902; Hartert, Nov. Zool., Vol. XII., p. 206, 1905; Hall, Key Birds Austr., 2nd ed., p. 102, 1906; Mathews, Handl. Birds Austral., p. 38, 1908; Macgillivray, Emu, Vol. X., p. 224, pls. xxvi., xxvii., 1910; North, Austr. Mus. Spec. Cat., no. 1, Vol. III., p. 343, 1912; Macgillivray, Emu, Vol. XIII., p. 148, 1914.

Sula dactylatra Mathews, Nov. Zool., Vol. XVIII., p. 9, 1911; Mathews, *ib.*, p. 242, 1912.

Sula dactylatra bedouti Mathews, Austral Av. Rec., Vol. I., p. 189, 1913; Bedout Island, Mid-west Australia.

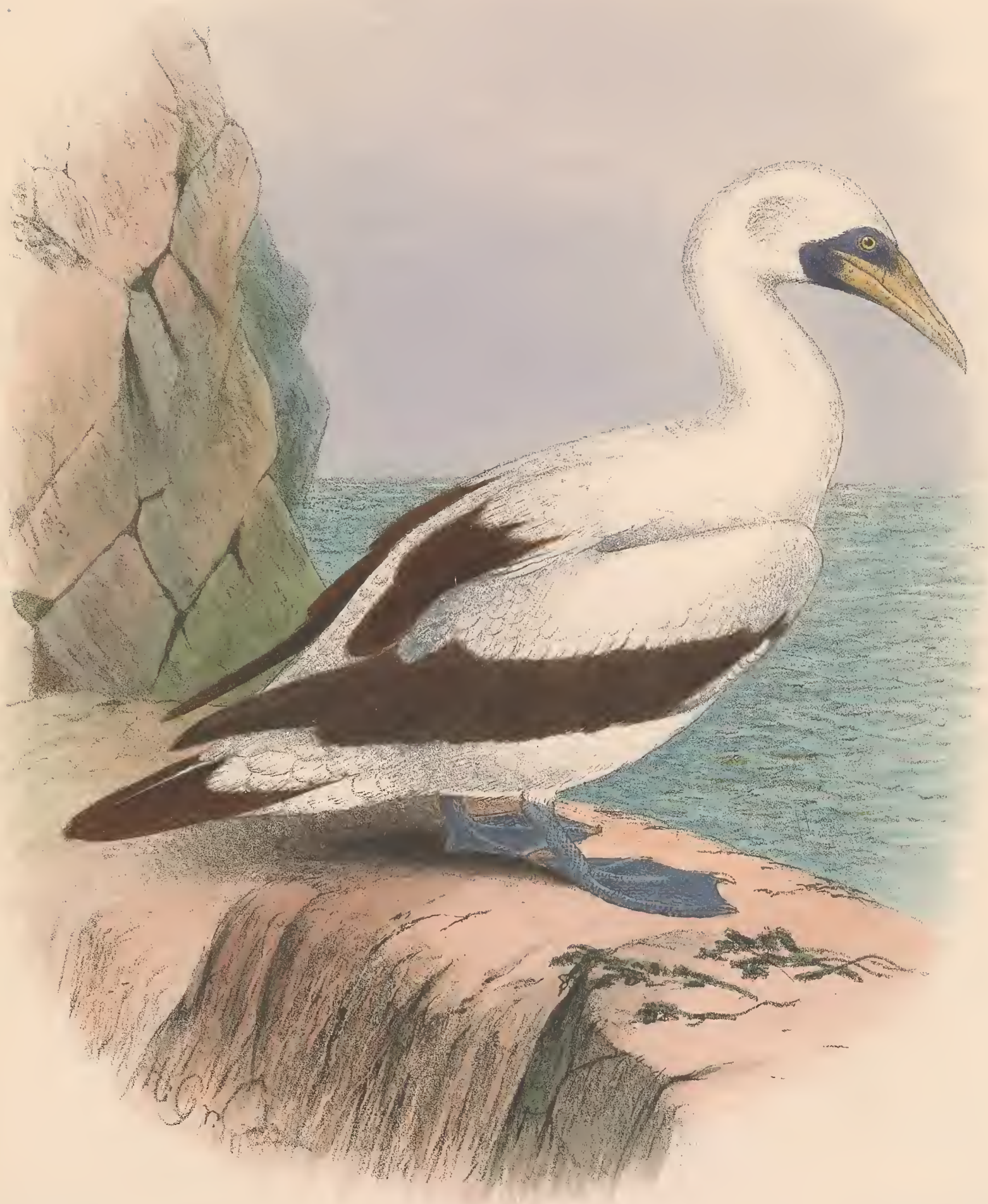
Sula dactylatra personata Mathews, *ib.*; Mathews and Iredale, Ibis 1913, p. 417; Iredale, Trans. New Zeal. Inst., Vol. XLV., 1912, p. 86, 1913; Rothschild, Bull. Brit. Orn. Club, Vol. XXXV., 1915, p. 43.

Parasula dactylatra personata Mathews, List Birds Austr., p. 99, 1913.

Parasula dactylatra bedouti Mathews, *ib.*

DISTRIBUTION. North-east to North-west Australia.

* The Plate is lettered *Sula personata*.



H. Grönvold. del.

Witherby & C^o

$\frac{1}{4}$
SULA PERSONATA.
(MASKED GANNET).

AUSTRALIAN MASKED GANNET.

Adult male. General colour above and below pure white ; bastard-wing, primary-coverts and quills chocolate-brown, somewhat paler on the secondaries ; inner webs of primaries hoary or silvery-grey, becoming white on the inner webs of the secondaries towards the base ; tail-feathers also chocolate-brown with white shafts. Bill light yellowish-horn ; base and skin dull purplish-blue ; iris yellow ; feet blue. Total length 840 mm. ; culmen 99, wing 417, tail 177, tarsus 56.

Adult female. Similar to the adult male but larger. Total length 860 mm. ; culmen 105, wing 429, tarsus 59.

Downy young. Pure white in colour (Macgillivray).

Nest. None (J. T. Tunny).

Eggs. Almost invariably two in number (Macgillivray). Two eggs (J. T. Tunny), bluish-white, covered with lime. Axis 64-69 mm. ; diameter 44-46.

Breeding-season. July onwards (Macgillivray) to October (?).

“THE Masked Gannet, a fine white bird, larger than the other two (Brown and Red-legged), with dark pinions and conspicuous pale leaden-coloured mask, comes next in numbers to the Brown Gannet, and their nests and young are scattered amongst the others promiscuously all over the islet. The nests in size, formation and situation differ in no wise from those of the Brown bird, being mostly on the ground. The eggs, larger in general than those of the Brown, are almost invariably two in number. The nestling Masked Gannet is much the same as that of the Brown, except that the mask is decidedly darker in colour. The downy young is pure white in colour, and, when feathered, a greyish or dirty white, the mask getting lighter coloured as the bird matures. The sitting birds of both species allow of a close approach, becoming restless and picking up and throwing the sticks and shells of the nest from side to side. When closer, they often disgorge one or more good-sized fish, then run off the nest with shuffling feet and flapping wings till they rise on the wing. This disgorging is not done as a means of offence, the fish being given more as an offering to distract the attention of an enemy from themselves until escape is possible, or even from their young, much in the same way as it is disgorged when the bird is buffeted by a Frigate Bird.” *

In Vol. XIII., p. 148, 1914, Macgillivray added the following: “At the time of Mr. McLennan’s visit to Raine Island, on 10th July, 1911, a few of these Gannets had selected nesting sites, but none had laid. One egg was laid before he left on the 15th July.”

The preceding seem the only field notes recorded in connection with the Northern Australian bird, other observations recorded by Hull and Iredale for birds from Norfolk, Lord Howe and the Kermadec Islands being referable to a different subspecies.

* Macgillivray, *Emu*, Vol. X., p. 225, 1910 (Raine Island).

THE BIRDS OF AUSTRALIA.

In the *Catalogue of the Birds in the British Museum* this bird is called *Sula cyanops*, as of Sundevall 1837.

A footnote reads: "The description of *S. dactylatra* given by Lesson is unrecognisable." This footnote referred to the citation: "*Sula dactylatra* Less., 'Voy. Coquille,' Vol. I., p. 494, 1826," a second quotation reading: "*id. Traité d'Orn.*, p. 601, 1831." I investigated this matter and my results were given in the *Nov. Zool.*, Vol. XVIII., p. 9, 1911, where I commented: "This remark (*i.e.* the footnote above quoted) may be applicable to the note given in the 'Voy. Coquille,' but certainly not to the account in the *Traité*, which fixes the species as the bird called *cyanops* by Sundevall six years later. It appears probable that the Australian bird will bear the name given to it by Gould, viz., *personata*, but I have not yet sufficient material to decide."

Though giving the species a range "Tropical seas throughout the world," no subspecies were admitted by Ogilvie-Grant. He, however, gave a footnote (p. 431): "Judging from the descriptions published by various authors the colours of the soft parts in *S. cyanops* vary greatly." My own investigations into the records tend to show that the variation is due to locality, while the Norfolk Island birds seem to be larger than typical East Australian birds, while Atlantic birds, which are typical *dactylatra*, are smaller throughout. Hence I preserve Gould's specific name in a sub-specific sense for the Australian birds and will leave those from Norfolk Island to a later date. I refrain from giving measurements, as these vary according to the methods used by different individuals, but if these are taken correctly, my conclusions will be found to be accurate; the metatarsus and culmen shows the greatest discrepancies, being notably less in the Atlantic bird.

The bird figured and described is a male, collected on Bedout Island, Mid-west Australia, on the 24th of May, 1901.

While the preceding was in the printers' hands, a review of this species appeared in the *Bulletin of the British Ornithologists' Club*, Vol. XXXV., pp. 41-45, Jan. 27th, 1915, by the Hon. W. Rothschild. Though complaining that his own previous work had not been fully recognised by some writers, Mr. Rothschild writes: "Before going into the details of the *cyanops* group I must clear up a vexed question of synonymy," quite ignoring the fact that in his own Journal, the *Novitates Zoologicae*, in 1911, the "vexed question" had been discussed and "cleared up" in the same manner as he now does it three and a half years later. Example is better than precept, and acknowledgment of previous work would have more forcibly brought the mistakes of others home to them.

AUSTRALIAN MASKED GANNET.

Rothschild has used the bill and feet, size and coloration, and characterizes the subspecies as follows :

Sula dactylatra dactylatra Less.

Bill horny blue-grey, very slender ; feet and legs yellow.

Range : Ascension Island and S. Atlantic Coasts.

Sula dactylatra melanops Hartl.

Bill greenish-yellow, slender ; feet and legs slatey-blue to dull black.

Range : Western Indian Ocean (Red Sea and Islands north of Madagascar).

Sula dactylatra personata Gould.

Bill yellow, very stout and large ; feet and legs greenish-blue.

Range : Western Pacific.

Sula dactylatra californica Rothsch. nov.

Bill bright yellow, very thick ; feet and legs orange.

Range : Coasts of California and Central America.

Obs.—In addition to the colour of the soft parts, this race differs from *S. d. dactylatra* in having a much larger and stouter bill.

Sula dactylatra granti Rothsch.

Bill red ; feet bluish-green.

Range : Galapagos Islands.

In his account Rothschild also admits that “sea-birds are much more restricted in their areas than was formerly supposed,” a fact I have emphasized for some years now.

I would still leave in abeyance the matter of the Australian subspecies until I have studied my large Eastern Australian series. It will be observed that Rothschild has not mentioned my *Sula dactylatra bedouti*, and has not included its locality under any of the forms he has recognised. Consequently I cannot understand where he would place it. It neither comes from the Western Indian Ocean nor the Western Pacific, so that it might be regarded as the sixth form. I, however, am not certain as to its status, and therefore have placed it with *S. d. personata*, very probably incorrectly.

GENUS—S U L A .

SULA Brisson, Ornith., Vol. VI., p. 494, 1760 .. Type *S. leucogaster*.

Also spelt—

Suca Temminck, Manuel d'Orn., p. 592, 1815.

Jula Ellman, Zoologist 1861, p. 7472.

Dysporus Illiger, Prodromus Syst. Mamm. et Av.,

p. 279, 1811 Type *S. leucogaster*.

Also spelt—

Disporus Boie, Isis 1826, p. 980.

Sularius Rafinesque, Analyse Nat., p. 72, 1815 (cf. Auk,

26, p. 50) Type *S. leucogaster*.

Abeltera Heine, Nomencl. Mus. Hein. Ornith., p. 351,

1890 Type *S. leucogaster*.

Hemisula Mathews, Austral Avian Record, Vol. II.,

p. 55, 1913 Type *S. leucogaster*.

SMALL Suline birds of dark coloration above, with general characters as in *Piscatrix*, but with different proportions.

The bill is a little longer, but the tail is much shorter, while the metatarsus and toes are notably long.

The bill is typically Suline, more than half the length of the tail, but less than twice the metatarsus.

The wing is long, more than twice the length of the tail.

The metatarsus is coarsely reticulate with small scales, the scales being smaller on the hinder aspect.

The toes have the posterior joints clearly reticulate, the anterior ones covered with scutes more or less broken up.

This genus is defined at once by the coloration of the adult, a character differentiating it at once from the rest of the Suline birds.

The immature plumage of this bird and *Piscatrix* show great similarity, while the adults show just as great a dissimilarity. The evolution of *Piscatrix* from its immature whole brown plumage passes through the stage when the brown is lost on the belly first. The present genus seems to show a peculiar stoppage in this course, this bird showing a brown coloration throughout, save the breast and abdomen, which are pure white. Though practically the same wing-length is developed, the tail in *Piscatrix* has grown much longer, the metatarsus lengthening in *Sula*.



H Grönvold, del.

Witherby & Co.

$\frac{1}{3}$

SULA LEUCOGASTER.
(BROWN GANNET).

SULA LEUCOGASTER PLOTUS.

AUSTRALIAN BROWN GANNET (BOOBY).

(PLATE 228.)*

PELECANUS PLOTUS Forster, Descr. Anim., ed. Licht., p. 278, 1844; near New Caledonia.*Pelecanus plotus* Forster, Descr. Anim., ed. Licht., p. 278, 1844.*Sula fusca* (not Vieillot) Gould, Birds Austr., Vol. VII., pl. 78, 1846; Reichenbach, Synops. Natatores, pl. xxix., fig. 850; pl. 55, figs. 2296-7, 1850; Macgillivray, Narr. Voy. "Rattlesnake," Vol. II., App., p. 359, 1852; Ramsay, Proc. Linn. Soc. N.S.W., Vol. IV., p. 84, 1879; Finsch, Ibis 1881, p. 540; Tristram, Ibis 1882, p. 144; Hamilton, Trans. New Zeal. Inst., Vol. XXI., p. 128, 1889; Macgillivray, Emu, Vol. XIII., p. 148, 1914.*Dysporus sula* Bonaparte, Consp. Gen. Av., Vol. II., p. 164, 1856 (part).*Sula fiber* (not Linné) Gray, Ibis 1862, p. 250; Gould, Handb. Birds Austr., Vol. II., p. 507, 1865; Gray, Handl. Gen. Sp. Birds, pt. III., p. 126, 1871 (part); Masters, Proc. Linn. Soc. N.S.W., Vol. I., p. 64, 1876; Ramsay, *ib.*, p. 386, 1877; *id.*, *ib.*, Vol. II., p. 203, 1878; (?) Walker, Ibis 1892, p. 257.*Sula leucogastra* (not Boddaert) Sclater and Salvin, Proc. Zool. Soc. (Lond.) 1878, p. 651; Salvadori, Orn. Papua. e Moll., Vol. III., p. 421, 1882; Ramsay, Tab. List Austr. Birds, p. 24, 1888; North, Austr. Mus. Cat., no. 12, p. 364, 1890.*Sula sula* Ogilvie-Grant (not Linné), Cat. Birds Brit. Mus., Vol. XXVI., p. 436, 1898 (part); Hall, Key Birds Austr., p. 102, 1899; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 988, 1901; Tunny, Emu, Vol. I., p. 73, pl. II., 1902; Hartert, Nov. Zool., Vol. XII., p. 206, 1905; Hall, Key Birds Austr., 2nd ed., p. 102, 1906; North, Austr. Mus. Spec. Cat., no. 1, Vol. III., p. 350, 1912.*Sula leucogaster* Mathews, Handl. Birds Austral., p. 38, 1908; Campbell and White, Emu, Vol. X., p. 203, 1910; Macgillivray, *ib.*, pp. 219, 224, pls. xxvi., xxvii., 1910; Broadbent, *ib.*, p. 245, 1910; Hill, *ib.*, p. 265, 1911; Mathews, Nov. Zool., Vol. XVIII., p. 242, 1912.*Sula leucogaster rogersi* Mathews, Austral Av. Rec., Vol. I., p. 189, 1913; Bedout Island, Mid-west Australia.*Sula leucogaster leucogaster* Mathews, *ib.**Hemisula leucogaster plotus* Mathews, List Birds Austr., p. 99, 1913.*Hemisula leucogaster rogersi* Mathews, *ib.** The Plate is lettered *Sula leucogaster*.

THE BIRDS OF AUSTRALIA.

DISTRIBUTION. North-east and North-west Australia.

Adult male. Entire upper-parts, throat, fore-neck, and sides of breast chocolate brown, somewhat darker and more blackish on the primary-quills; secondaries white at the base of the inner webs; under wing-coverts chocolate brown except the median series which are white; breast, abdomen, sides of body, axillaries, and under tail-coverts pure white. Bill and skin yellow, spot in front of the eye blue; iris silver grey; feet pale yellow. Total length 710 mm.; culmen 84, wing 374, tail 200, tarsus 43.

Adult female. Similar to the adult male but larger.

Immature and young. As described by Dr. Macgillivray in the text.

Nest. "A small hole scratched in sand, sometimes a few pieces of sponge, etc., strewn round" (J. T. Tunny).

Eggs. Two eggs (J. T. Tunny). Two eggs (Macgillivray). Bluish-white, covered with lime. Axis 53-63 mm., diameter 36-46.

Breeding-season. July onwards (Macgillivray) to October (?).

THE only observations on record in connection with this bird are again due to the investigations of the two Macgillivrays, sixty odd years intervening between the records.

The elder Macgillivray's account, printed by Gould, reads: "This species of Booby is generally distributed on the north-east and north coasts of New Holland, but I found it breeding only upon Bramble Key, although I once, on Raine's Islet, found a solitary egg. The nest is slovenly made, of dried herbage, a foot in diameter, with scarcely any cavity, and contains two eggs, of which in every instance one was clean and the other very dirty. The eggs, which are white, vary considerably in size. The largest measured $2\frac{3}{4}$ inches by $1\frac{7}{8}$; the smallest $2\frac{1}{2}$ by $1\frac{7}{8}$, and one of average size, $2\frac{1}{2}$ by $1\frac{3}{4}$ inches. Both sexes incubate, and the birds while sitting on their eggs allowed of a very near approach, and before flying off disgorged the contents of their stomachs, chiefly a species of *Clupea*. I need scarcely add that their bite is very severe. During our visit to Darnley Island I observed several tame Boobies among the native villages, generally perched on the canoes hauled up on the beach. These birds were allowed their full liberty, and after fishing in the weirs upon the reefs until they had procured a sufficiency of food, returned to the huts."

Nothing further appears to have been written in connection with these birds until Dr. Macgillivray made a trip to the same ground as the elder Macgillivray had visited. In the meanwhile Tunny had examined a colony on Bedout Island, Mid-west Australia, and collected some specimens, but gave no account of the habits of the birds.

The younger Macgillivray's observations are given herewith in full:

Sula leucogaster Macgillivray, *Emu*, Vol. X., p. 223, 1910: "We sight many Brown Gannets, and when we near the most easterly of the banks

AUSTRALIAN BROWN GANNET (BOOBY).

(No. 3, Ashmore Sandbanks, Great Barrier Reef), we notice a number of these birds, and decide to land, and also to anchor for the night, the wind and tide making it impossible for us to reach the shelter of the Barrier. We have a large escort of Gannets by the time we anchor. On landing, most of the top of the bank is seen to be occupied by Brown Gannets. Most of these rise as we approach, leaving about 30 sitting birds. These permit of a close approach before leaving their nests—as well, too, for no sooner does a bird quit its nest than a Gull seizes an egg and makes off with it. As usual they are constantly on the watch to steal other birds' eggs in all the rookeries visited by us. There are about 50 nests, 30 of which contain two eggs each and the rest one—mostly incomplete clutches or reduced by the Gulls. Numbers of the nests are just being scraped out. The nests are merely a depression scraped in the sand, some hollows having bits of straw, stick, coral or shell gathered round them; dimensions: 1 foot in diameter and 4 inches in depth. This rookery has not long been occupied, as the eggs are all either fresh or at an early stage of incubation. This species is also nesting in smaller numbers on No. 2 Sandbank. . . . We discern a cloud of sea-birds over the island (Raine Island) and under an escort of Brown (*Sula leucogaster*), Red-legged (*Sula piscatrix*), and Masked Gannets (*Sula cyanops*), we soon sight the island itself. We are puzzled at first with the Red-legged Gannet, as there are more immature than mature birds flying, and the difference in colouring is considerable. Nearing the anchorage at the north-west corner, we are surrounded by a vast number of Gannets (mature and immature), Frigate-Birds, Noddies, Sooty and Brown-winged Terns and Gulls. . . . When we land the birds rise in a dense cloud until the air is full of them and still there seem to be thousands of old and young birds remaining on the ground. . . . Fully nine-tenths of the nesting birds are Brown Gannets, which are all over the island, some sitting on either fresh or incubating eggs, small naked young or young in down, or feeding nearly fully-fledged birds, while many are just starting to scoop out their nests in the sand, these depressions varying from 8 inches to 12 inches in diameter and 3 or 4 inches in depth, sometimes with sticks, bits of coral, shells, or dirt collected round them. Many are on bare coral rock, or on the pig face flattened down. Most of the nests contain a pair of eggs, there being great variation in the size and shape of the eggs, though the two eggs in any one nest usually match. The young birds are hatched with eyes closed, with only an indication of down on head, back, humeral, femoral, and each pectoral region. The eyes open very soon, and the birds become covered with whitish down at an early stage, the beak and legs being of a pale slatey-grey, much the same colour as the naked skin: the gape also a pale slate colour. They

THE BIRDS OF AUSTRALIA.

grow almost to full size before acquiring any feathers, the first to appear being the primaries, then the scapulars and feathers of head, and secondaries, with the tail-feathers, this first feathering being a brownish-grey. This colour is general on head, back and wings, with dirty-greyish breast, abdomen, and under-surface of wings when they fly. The young birds hatched out often show great disparity in size, one being hatched some days later than the other. This usually results in only one surviving, as, in proportion to the number of nests containing a pair of eggs, very few seem to rear more than a single young one. The naked skin on the face of the adult Brown Gannet shows a good deal of variation in colour, some being of a greenish-yellow, others of quite a blue colour."

The following year McLennan again visited Raine Island on account of Dr. Macgillivray, and the latter gave the results in the *Emu*, Vol. XIII., p. 148, 1914.

"Mr. McLennan visited Raine Island early in July, 1911, and found this Gannet scattered all over the island, but only eight nests contained two eggs each, several contained one egg, and there were no young birds. Evidently the birds had only started nesting."

On 27th July, 1911, he visited Bramble Cay, of which visit he writes as follows: "When at Darnley Island we heard that the natives and South Sea Islanders from there and from Murray Island were in the habit of paying weekly visits to Bramble Cay for the purpose of getting eggs and birds for food during the breeding-season, and that they brought them away in boat loads: also that a cutter had set out for Raine Island about the same time as ourselves, but had to put back on account of bad weather, and that three boats had just left Murray Island for Raine Island. At Bramble Cay I found only two nests of the Brown Gannet containing two eggs, and three containing one egg, five nests with one young bird in each, and dozens of nests from which eggs had been taken. I also saw a great pile of skins near a heap of ashes, where the blacks had been having a feast."

I recently separated the West Australian bird, but here suppress it and only recognise the fact that Australian birds differ from Atlantic specimens in the depth of the coloration of the upper surface and in their superior size throughout.

The name given by Forster to a specimen killed off New Caledonia is the oldest one available and therefore comes into use.

The following account is worthy of reproduction, but the identity of the birds is uncertain: apparently Walker's *S. cyanops* is the present species and his *S. fiber* something else, not as generally synonymized.

AUSTRALIAN BROWN GANNET (BOOBY).

J. J. Walker, in the *Ibis* 1892, p. 257, writing on the Bird Life of Adèle Island, North-west Australia, recorded:

“On the beach just above the line of the highest tides, and at intervals of a few yards apart, were little communities of two species of Gannets—the widely-distributed ‘Booby,’ *Sula fiber* Linn., and the fine dark brown and white *S. cyanops* Sundevall—engaged in incubation. The two species usually kept separate, though occasionally one or two of one kind would be found in a group of the other, apparently not regarded as intruders. Both birds made very similar rude nests of seaweed, about two feet in diameter and not exceeding three or four inches in height, but in many cases the eggs were deposited in a mere slight hollow in the sand, without any attempt at a lining. Two eggs were the usual number laid by each bird, those of the *S. cyanops* ($2\frac{1}{2}$ by $1\frac{1}{2}$ inch) being as a rule rather larger and more elongate in outline than those of the *S. fiber*, the average measurement of which was $2\frac{5}{16}$ by $1\frac{1}{8}$ inch. Both were of the same greenish-white colour, with a dense white chalky coating. Very many of the nests contained young birds—some hatched only that morning and perfectly naked; others were half the size of the adults, and densely clothed with pure white down. The behaviour of the two birds, when approached, was strikingly different—the *S. fiber* only giving vent to a feeble croak or two, and then scuttling awkwardly off the nest and away out to sea, returning however in a few minutes; the *S. cyanops*, on the other hand, made a fierce resistance, biting savagely at a stick presented to it, and uttering a succession of loud harsh croaks, or rather barks, while the bird had to be fairly shoved off the nest before it would quit its eggs or young. All the time hundreds of the Gannets, chiefly of the brown species, were on the wing, sailing overhead with the quietness of Owls, and often coming within two or three yards of me as I strolled along the beach.”

The bird figured and described is a male, and was collected on Bedout Island, Mid-west Australia, on the 22nd May, 1901.

GENUS—F R E G A T A .

FREGATA Daudin, in Hist. Nat. (Buffon) ed. Didot Quadr.,
Vol. XIV., p. 317, 1802 Type *F. minor*.
(Lacepède, Tableau Oiseaux, p. 15, 1799, n.n.)

Also spelt—

Fregatta Stephens, in Shaw's Gen. Zool., Vol. XIII., pt. 1., p. 119, 1826.

Tachypetes Vieillot, Analyse nouv. Ornith., p. 63, 1816 .. Type *F. minor*.

Also spelt—

Tachypletis Stephens, in Shaw's Gen. Zool., Vol. XIII., pt. 1., p. 119, 1826.

Atagen Gray, List Genera Birds, 2nd ed., p. 101, 1841 .. Type *F. minor*.

Also spelt—

Attagen (nec Kaup.) Ogilvie-Grant, Cat. Birds Brit. Mus., Vol. XXVI., p. 442, 1895.

LARGE birds with long hooked bills, very long wings, very long forked tails, slender bodies, and very small legs and feet, the toes semi-palmate, but the hind toe connected with a web. The bill is very long, much longer than the head; it is very strongly hooked, both mandible tips being downward bent; the upper mandible is composed of separate pieces recalling that of a procellarian bird; the culminicorn is broad and flattened, a groove extending its length separating it from the laterals, which are also broad and flattened; the edges of the mandible are complete, no serration being present. The rami of the lower mandible are straight and deep and enclose an unfeathered tract which develops in the male into a huge gular pouch. The length of the chord of the culmen is about twice the length of the middle toe. The nostrils are linear slits placed near the base of the culmen. The wings are very long and pointed, the first primary much the longest.

The tail is very long and very deeply forked: it is more than half the length of the wing.

The metatarsus is very short and feathered.

The toes are comparatively long and thin, and are toti-palmate, but the webs are so deeply incised that semi-palmate would better describe them; the toes are obscurely scutellate, the middle toe about twice the length of the metatarsus and half the length of the chord of the culmen; the hind toe is long, not much shorter than the inner, the middle toe being longest, the outer longer than the inner; the claw of the middle toe is very long and serrated.

Though this genus covers the family *Fregatidae*, which is placed in the Order *Pelecaniformes*, mainly on account of the toti-palmate character of the

FREGATA.

feet, it offers so many peculiarities externally that its association with the other members of the Order has caused much doubt. The investigations of the anatomy of this aberrant group have all been carried out under the prejudice of the toti-palmation of the feet, yet all the investigators have recorded sufficient differences to negative the reference, while confirming it. Many have indicated suggestive relationships with the *Procellariiformes*, but have been compelled to minimise these and exaggerate the *Steganopode* affinities. Externally the bill somewhat recalls that of a procellarian bird.

Pycraft wrote upon the *Steganopodes* as a natural group in the *Proc. Zool. Soc. (Lond.)* 1898, pp. 82-101, and though he concluded that this was so, a criticism of his statements does not influence me in confirming the conclusion. The following clauses do not seem to be sufficiently explained away:

"In the sternum of the *Steganopodes* . . . save in *Phaethon* and *Fregata*. . . . In *Phaethon* the carina is of the same form, but continued backwards farther than in any other *Steganopod* save *Fregata*. . . . The sternum of *Fregata* is unique. . . . The pelvis of *Phaethon* and of *Fregata* closely resemble one another, and both differ much from that of any other *Steganopod*. . . . What is more to the purpose is the fact that there are many points of resemblance between the pelvis of *Fregata* and that of certain *Procellariæ*, e.g. *Bulweria*. . . . The tarso-metatarsus in all save *Fregata*. . . . Save in *Phaethon* and *Fregata* (the hypotarsus). . . . All, save *Phaethon* and *Fregata*, have lost the vomer."

Beddard had written: "So different are the skull characters of *Phaethon* from those of the typical *Steganopodes* that, were it not for *Fregata*, the bird would have to be ignominiously expelled from the Order. This catastrophe is averted by *Fregata*, the skull of which, as will have been gathered from the foregoing remarks, serves to link *Phaethon* with the Cormorants, Gannets and Pelicans." (*P.Z.S.* 1897, pp. 292-3.)

In the *Structure and Classification of Birds* 1898, p. 417, Beddard summarised: "There is no doubt that *Phaethon* is very different from the other genera of the group; indeed, if it were not for *Fregata* it would be difficult to avoid removing it altogether."

I can see *no* relationship whatever between these two. Examination of the bills of downy nestlings of these genera show them to be essentially different, while the feet are extraordinarily dissimilar. The bill of the juvenile *Fregata* suggests that of a young petrel, but it may be that the resemblance is due to convergence only. The forked tail of *Fregata* is quite an abnormal feature, however it is regarded. The semi-palmation of the feet is quite as abnormal, while the position of the long hind toe disagrees with that of true *Steganopodes*. I would here suggest that unprejudiced study of

THE BIRDS OF AUSTRALIA.

juveniles would aid in correctly classifying this group, and would point out that the feather-growth differs essentially in *Fregata* from that observed in *Sula*, *Phalacrocorax*, etc. I do not consider *Phæthon* a true *Steganopod*.

With regard to the genus-name, a few remarks should be made. *Fregata* of Lacepède has been recently commonly quoted, but it is obvious no writer so using it had previously read the diagnosis given by Lacepède. For in the *Tableau Oiseaux*, p. 15, we get:

“Deuxième sous-division. Quatre doigts réunis par une large membrane. Oiseau d'eau latirèmes. Bec crochu. Frégatte. *Fregata*. Le bec long et tres-crochu vers son extrémité.” There is absolutely nothing in this at all diagnostic of this genus, while of the general characters the sentence: “Quatre doigts réunis par une *large* membrane” is quite inapplicable. At this quotation the name can therefore only be considered as a *nomen nudum*.

In the Didot edition of *Buffon's Hist. Nat. Quadrupedes*, Vol. XIV., the above was reprinted on p. 317, 1802, by Daudin, who added as the only species: “La Frégate. *Fregata aquilus*, XVI., 308.” The reference is to the volume of birds, where Buffon gives the history and a figure of La Frégate, and the name can be utilised as of Daudin: the type, however, is *Fregata minor* Gmelin, not *F. aquilus* Linné.

Key to the Species and Subspecies.

A. Uniform black. Males.

- a. Size large; wing over 550 mm.; no white flank patches *F. m. listeri.*
- b. Size small; wing over 535 mm.; white flank patch on each side *F. a. tunnyi.*
- c. Size small; wing under 535 mm.; white flank patch on each side *F. a. ariel.*

B. Breast white. Females.

- d. Size large; wing over 590 mm.; no light collar at back of neck *F. m. listeri.*
- e. Size small; wing over 545 mm.; rusty and white collar at back of neck *F. a. tunnyi.*
- f. Size small; wing under 545 mm.; rusty and white collar at back of neck *F. a. ariel.*

NOTE.—In the Australian forms the females are easily distinguished by means of the light collar on the hind neck as well as by size. In other races, as Rothschild and Hartert point out, the collar is observed in the female of the large form, but in those cases there is such a discrepancy in size that no confusion is possible.

Order PELECANIFORMES

No. 284.

Family FREGATIDÆ.

FREGATA MINOR LISTERI.

GREATER FRIGATE BIRD.

(PLATE 229.)*

FREGATA MINOR LISTERI Mathews, Austral Av. Rec., Vol. II., p. 119, 1915; Christmas Island.

Atagen aquila (?) Gould, Introd. Birds Austr., 8vo., p. 119, 1848; *id.*, Birds Austr., Vol. I., Introd., p. c, 1848.

Tachypetes aquila Gould, Handb. Birds Austr., Vol. II., p. 499, 1865; Masters, Proc. Linn. Soc. N.S.W., Vol. I., p. 64, 1876.

Atagen aquilus Ramsay, Proc. Linn. Soc. N.S.W., Vol. II., p. 203, 1878; *id.*, Tab. List Austr. Birds, p. 25, 1888.

Fregata aquila Ogilvie-Grant, Cat. Birds Brit. Mus., Vol. XXVI., p. 443, 1898 (part); Hall, Key Birds Austr., p. 103, 1899; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 989, 1901; Vivian, Emu, Vol. IV., p. 55, 1904; Hall, Key Birds Austr., 2nd ed., p. 103, 1906; Mathews, Handl. Birds Austral., p. 38, 1908; Barnard, Emu, Vol. XI., p. 20, 1911 (?).

Fregata aquila palmerstoni (not Gmelin) Mathews, Nov. Zool., Vol. XVIII., p. 242, 1912; *id.*, List Birds Austr., p. 100, 1913.

Fregata minor listeri Mathews, Austral Av. Rec., Vol. II., p. 119, 1915 (Christmas Island).

RANGE. Northern Australia (accidental); Victoria (one record, Campbell); Christmas Island (breeding).

Adult male. General coloration throughout black; a brownish tinge observed on the under-parts; the feathers of the head long and narrow and showing a dull blue-green sheen; the feathers of the back lanceolate and elongate, showing a shiny oil green gloss; the primaries and rectrices are tinged with a bluish bloom; innermost secondaries brownish; the median wing-coverts dark brown. Coloration of iris, bill, and feet unrecorded. Culmen 96 mm., wing 558, tail 365, middle toe 50. (Type of *F. m. listeri* collected at Christmas Island by Dr. C. W. Andrews, F.R.S., and now in my collection.)

Two birds in the British Museum supposed to have been procured in Queensland agree fairly well and measure—

Culmen 100	Wing 550	Tail 420	Middle toe 55 mm.
„ 105	„ 565	„ 370	„ 50

* The Plate is lettered *Fregata palmerstoni*.



H Grönvold del

Witherby & Co

$\frac{1}{4}$
FREGATA PALMERSTONI.
(*EASTERN FRIGATE BIRD*).

GREATER FRIGATE BIRD.

Adult female. Head and neck all round and all upper-parts dark; throat ashy; lower neck, breast, and sides of body pure white; middle of lower breast, abdomen, and flanks black; the feathers of the head are shorter than in the male and are comparatively dull; brown collar on back of neck; the feathers of the back are not conspicuously elongated and lack the brilliant sheen of the lanceolate plumes of the male; innermost secondaries brownish; the lesser and median-coverts are brownish with paler margins, forming a somewhat conspicuous bar parallel to the shoulder. Coloration of iris, bill, and feet unrecorded. Culmen 107 mm., wing 599, tail 410, middle toe 54. (The female of *F. m. listeri* collected at Christmas Island by Dr. C. W. Andrews, F.R.S., and now in my collection.)

Immature male. Head and neck all round white, pouch showing; breast with rusty patch; lower breast black as are sides of body; centre of abdomen, lower flanks, and vent white; under tail-coverts black with small white tips; rest of upper-parts dusky brown and black according to wear; median wing-coverts brownish forming a narrow bar. Coloration of iris, bill, and feet unrecorded. Culmen 92 mm., wing 570, tail 350, middle toe 49 (New Zealand). (Another collected by J. Macgillivray at Oomaga Island, Torres Straits, agrees but is slightly larger.)

Immature, Younger, and Nestling. Undescribed.

Nest. Placed in trees or on the ground; rather bulky, composed of sticks.

Eggs. Clutch one, white, covered with creamy lime; axis 66 to 68 mm., diameter 45 to 46 (Torres Straits).

“It was from the same point—Cape Nelson—that a coming ‘blow’ from the southward was always heralded some hours before by the appearance of a few Frigate Birds (*Fregata aquila*) which hovered in the locality, while the wind lasted, and as like mysteriously disappeared. It would be more appropriate to call them ‘Prophet Birds.’ During a gale they meet the fierce gusts with seeming equanimity, neither wing moving, but with bodies rigid and heads to windward they remain almost stationary, except occasionally a slightly perceptible swaying and momentarily opening and closing of the tail-feathers—a steadying agency probably, besides an aid to ascent—of which a few remarks will be added later. Then with a lightning turn they gracefully sweep at a downward angle with fearful velocity for any given distance with the wind, and then with most consummate ease bring up ‘all standing’ poised as before (see fig. 3), the wings meanwhile remaining stiff, but scarcely horizontal, at the time the bird prepares to turn. Such a resistance do they offer to a storm that when sometimes a bird is balanced a short distance overhead one can almost imagine seeing the wind rushing past its form. They have never been observed to approach the water closer than 300 feet, while, on the other hand, they often soar upwards to a considerable height. The evident method these birds adopt to ascend is peculiar, and very interesting to watch at close quarters. For, though the bird itself is practically rigid, except for slight movements—particular parts of which have been alluded to—yet those simple actions really explain how the bird rises. Thus, in addition to what has already been stated, they

THE BIRDS OF AUSTRALIA.

consist of upward and forward motions, as if, while pressing against the wind, advantage is taken when a lull occurs (see fig. 1); and, secondly, with head still to windward, allowing itself to fall back a few yards as though for a 'breather,' but still maintaining a slight upward tendency during the progress (see fig. 2). Then repetitions *ad. lib.* (see diagram).*

"Their rate of speed when with the wind would be quite 60 to 70 miles an hour, if not more." †

The first appearance of this species in Australian literature was when Gould in the *Introduction of the Birds of Australia*, 8vo., p. 119, 1848, wrote: "Although I have figured but one, there are evidently two, if not three species of this genus in Australia, but I have not had sufficient opportunities to investigate the subject satisfactorily." He then added to the Australian Avifauna *Attagen aquila* (?)

In the Table of the Range of the species given on p. 134, he placed an asterisk under Northern Australia as the habitat of this form.

In the *Handbook*, Vol. II., p. 498-9, 1865, he amplified this by writing under the genus name *Tachypetes* Vieillot: "Two species of this aërial form inhabit Australia, both of which are common in Torres Straits at one or other season of the year. No birds differ more than the members of this genus, for some examples have white and others brown heads, and moreover exhibit many other conflicting differences, both in colour and size. Until the question is settled as to whether there be more than two species of this genus, which at present I have no means of determining, I shall refer both the Australian birds to the old *T. aquila* and *T. minor*." Then under *T. aquila* he noted: "I have received numerous skins of a Frigate Bird from Torres Straits which are much larger than the succeeding species (*T. minor*=*ariel*), and which may be referable to the *Pelecanus aquilus* of Linnæus: but this requires confirmation."

Campbell, in his *Nests and Eggs*, p. 989, added: "The Frigate Bird . . . is to be found off Northern Australia. However, a few stragglers get into more temperate waters. A specimen was captured at Brighton, Port Phillip, and is now in the National Museum, Melbourne. I am not sure whether the bird has been taken off the New South Wales coast."

The determination of the species and subspecies of the genus *Fregata* has proved one of the most interesting studies yet made by me in connection with the Australian Avifauna. In the *Catalogue of the Birds in the British Museum*, Vol. XXVI., p. 443 *et seq.*, 1898, Ogilvie-Grant admitted two species, *Fregata aquila* Linn. and *Fregata ariel* Gould, the distribution of the

* These figures and diagrams are not here reproduced.

† Vivian, *Emu*, Vol. IV., p. 55, 1904.

GREATER FRIGATE BIRD.

former being given as "Tropical and Sub-tropical seas"—that of the latter, "Tropical parts of the Indian and Pacific Oceans, ranging west to Madagascar and east to the Society Islands."

On p. 442 a Key to the Species is given, showing the differential characters recognised by Ogilvie-Grant, and on pp. 446 and 449 details of the measurements of specimens are given, but of course no discussion of previous workers' conclusions is attempted. As commonly observed, Ogilvie-Grant did not concern himself with the discrimination of subspecies, and he has been unhesitatingly followed by all recent workers, though this group has been recorded in varied localities by many investigators during the last sixteen years. The most casual examination of the series preserved in the British Museum made certain that the Atlantic Ocean birds differed from those of the Pacific Ocean; the former place was the type locality of *Pelecanus aquilus* Linné, so in the *Nov. Zool.*, Vol. XVIII., p. 242, 1912, I used *Fregata aquila palmerstoni* Gmelin for the Australian bird, that name having a better claim for usage, as Gmelin had described a *Pelecanus palmerstoni* from Palmerston Island, Pacific Ocean. In the same place I recognised *Fregata ariel* Gould with no subspecific forms, Raine Island, North Australia, being the type locality of Gould's species.

In my List of the Birds of Australia, published at the end of 1913, I continued that usage, as I knew I should soon be monographing the group when the correct names would be exactly determined. I, however, added as a synonym of *Fregata aquila palmerstoni* Gmelin the name *Fregata strumosa* of Kittlitz, published by Hartert in connection with a Sandwich Island bird. I also wrote *Fregata ariel ariel* Gould, indicating that I had recognised subspecific forms. The complexity of the subject to be discussed compels me to review the whole of the literature and all the specimens available. As this is the first time such an attempt has been made I will again, as in the case of "*Puffinus assimilis* Gould" go into the literature first, then discuss the specimens and afterwards summarise the results. These will probably prove as startling to the readers as they have proved interesting to myself.

The first entrance into systematic work of any member of this group appears when Linné included in the *Syst. Nat.*, 10th ed., p. 133, 1758, *Pelecanus aquilus*. The determination of this is absolutely necessary before any further work can be done, but hereafter follows the only attempt I have seen.

Linné's description reads:

"*Pelecanus aquilus*. P. cauda forficata, corpore nigro, capite abdomineque albis. Amoen. Acad. 4, p. . . .

THE BIRDS OF AUSTRALIA.

“*Pelecanus aquilus*. Osb. iter. 292.

“Habitat in Insula Adscensionis aliisque pelagicis, vitam agens Diomedæ exulis, cui similis.”

The additional references are to “Brown, jam. 483. Laët. amer. 575. Sloan, jam. 1, p. 30. Pet. gaz., t. 45, f. 1 (?). Alb. av. 3, p. 75, t. 80, male.”

These are purely of historical interest, as Linné's species is based on Osbeck's account and locality. In every probability the only specimen Linné had seen was the one Osbeck brought back. Consequently Osbeck's account is valuable: the reference to the Amoen. Acad. was to a paper by Osbeck at that time unpublished. In his *Dagbok Ostind. Reise*, p. 292, 1757, Osbeck described the specimen procured at Ascension Island, and I give Forster's Translation, Vol. II., p. 87, 1771, for easy reference:—

“*Pelecanus aquilus*: its bill is more than a hand's breadth long, and is narrow; the upper jaw is somewhat the longest, with a hook-shaped point; the cere, which is blue, covers the bill from the eyes to the hook-shaped point; the mandibles have no such serrated incisions (supplying the place of teeth) as are usually found in sea birds; the head is covered with short feathers as far as the eyes, which are pretty large; the tongue is large, almost trifold at the top; the corner at its bottom is split; the temples are naked; the wings consist of three parts and are very long; of the twenty-two quill-feathers, the first ten are of a considerable length; the two inner joints contain, besides the coverts, twenty-two secondary feathers; the outward of the twelve tail-feathers are much longer than the middle ones, which make the tail look like a pair of scissors. The bird is about the size of a goose and is a yard long; the colour of the whole body, and of the toes, is black, but the head, breast, belly and fore-part of the neck are of a fine white. Its food is fishes, which it takes from others because it is not formed to catch them itself; the English for this reason call it Man-of-War.”

The paragraph preceding this, again quoting from Forster's translation, is worthy of reproduction:

“The Pelican, with the red bag under its neck, flew up and down, but would never settle. It is the same which, in hieroglyphical descriptions, is used as the emblem of great tenderness towards its young. It lives generally in the great African sandy deserts, where no water is to be met with, but it brings it for many miles in the bag below its throat, and fills the nest of its young ones: whither camels and other animals likewise resort to assuage their thirst. People who have seen it emptying its red water-bag have thought that it ripped up its breast and gave its young ones blood for want of water; but they were mistaken.”

GREATER FRIGATE BIRD.

Forster has identified this reference with "*Pelecanus onocrotalus*," but it is obvious that the bird Osbeck observed was the mature male of the immature bird he described as *Pelecanus aquilus*.

The only conclusion possible is that the type locality of Linne's species must be Ascension Island, and this has been accepted by all workers; the reason for my emphasis will be seen later.

Gmelin, in the *Syst. Nat.*, p. 572, 573, added three names thus: *Pelecanus minor*, *leucocephalos* and *palmerstoni*. The definition of the first reads:

"*P. cauda forficata*: corpore ferrugineo, rostro orbitesque rubris.

"*Fregata minor* Briss., av. 6, p. 509, n. 7.

"Multum aquilo affinis, gula etiam saccata, at minor, et 2 pedes, 9 pollices modo longus; pedes sordide lutei."

The other two are simply based on Latham, whose descriptions I append.

"White-headed Fr(igate) P(elican), *Gen. Synops. Birds*, Vol. III., pt. 2, p. 591, 1785. Size of a large *Duck*: length near three feet. Bill five inches long; colour dusky, except at the tip, where it is very pale, nearly white; both mandibles are hooked: the sides of the head covered with feathers; the head and fore-part of the neck are white, finishing in a point on the last; the breast and belly are also white; except these, the rest of the plumage is brown; the tail forked; legs reddish-brown. This is in the *Hunterian Museum*. . . . Not far different from the above is one mentioned by *Osbeck*. . . . This he met with at the *Isle of Ascension*."

A similar plumaged bird is described in connection, and Osbeck's description and notes are extracted from Forster's translation.

p. 592. "Palmerston Fr(igate) P(elican)" is described: "Length three feet two inches. Bill five inches and a half long, and hooked at the end, as in the *Cormorant*: colour black; space round the eyes well feathered; the upper part of the head, neck and body brown, with a greenish gloss; the wing-coverts nearest the body dark glossy green; fore-part of the neck mottled brown and white, the rest of the under-parts white; vent black; tail forked; the shafts of all the feathers white; legs dusky black; the middle claw serrated on the inside.

"Inhabits the island of *Palmerston*, in the *South Seas*. In the collection of Sir Joseph Banks."

In connection with the Lesser Frigate Pelican, Latham (p. 591) wrote: "This has a large red pouch at the chin and throat, as in the former species. It is most likely that mine is the *male* bird, as others, suspected to be of the opposite sex, have little or no traces of the jugular pouch." The footnote reads: "This supposition seems justified from a pair in the *Hunterian Museum*, in both of which the plumage is wholly black: the one

THE BIRDS OF AUSTRALIA.

has a large pouch, the other destitute of it." This is an important note, and attention will be drawn to it later.

Gmelin's *Pelecanus minor* depends upon Brisson's *Fregata minor*, which in its turn is based entirely upon "Edwards' Glanur, Part II., p. 209, Chap. XCIX.; avec une figure exacte, pl. 309." No locality is given by Brisson, who questions "C'est peut-être la femelle de la précédente." That two or more species were confused was early recognised by voyageurs, but the fact that these early descriptions referred to immature specimens made their separation difficult.

In 1848 Gould figured and described in the *Birds of Australia* a very small species under the name of *Fregata ariel*. With a craze for lumping and minimising the importance of new discoveries this was immediately suppressed in favor of Gmelin's *Pelecanus minor*, though practically nothing in the description is strictly applicable, the bill length "five inches" being certainly inapplicable, while the total length is also strongly in disagreement.

In Gray's *Handl. Gen. Sp. Birds*, pt. III., p. 131, 1871, as a synonym of *Atagen aquilus* L. appears "*caroliniana* Less." I have not traced Lesson's usage of this name, but I will show that by deduction Lesson's name would belong to the small bird. As synonyms of *minor* Gmel., Gray quotes "*palmerstoni* Gm." and "*ariel* Gould."

In the *Kat. Vögels. Mus. Senckenb.*, p. 235, 1891, Hartert described the bird named by Kittlitz *Fregata strumosa*, regarding it as synonymous with *Fregata aquila*, while in the synonymy of *Fregata ariel*, Ogilvie-Grant placed *Tachypetes chambeyroni* Montrouzier. Montrouzier, in the *Bull. Soc. Geogr. Franc.*, Series VI., Vol. XII., 1876, p. 646, 1877, regarding the avifauna of Huon and Surprise Islands, wrote as follows:

p. 645. "La frégate commune (*tachypetes aquilus*): une autre frégate à plumage brun largement traversé de blanc sur la poitrine, laquelle n'est peut-être qu'une variété d'âge ou de sexe de la précédente."

p. 646. "Et enfin une frégate qui est nouvelle pour moi et qui j'ai décrite ainsi, sous le nom de *tachypetes chambeyroni*, s'il y a réellement lieu de la considérer comme nouvelle. Taille de la frégate commune, d'un noir brun, plumes du dessus du dos longues, irisées, à reflets métalliques; un volumineux jabot placé sous la gorge, pouvant se gonfler, d'un rouge de sang, garni à la base de quelques plumes rares, courtes, distantes et de tuberculosités analogues à celles de la tête du dindon."

I see nothing whatever in this description that would cause the association of Montrouzier's name with the small bird in preference to the large and have italicised the line where Montrouzier gives the size of his new species as the same as that of the common one. The description applies

GREATER FRIGATE BIRD.

simply to the fully-plumaged male of the large bird, the white flanks distinctive of the small species being unnoticed. There are no other synonyms, but the views of previous workers need record so that my comments later can be easily understood.

As long ago as 1831, Lesson, from personal observation, included in his *Traite*, pp. 606-7 :

“La Frégate. *Tachypetes aquila* Vieill. Gal., pl. 274.

Pelecanus aquilus L. Enl. 961.

Male. Plumage noir : devant de la gorge nu et d'un rouge fulgide. Des Moluques, du Brésil, de toutes les terres intertropicales. *Femelle* (*Pelecanus leucocephalos* L.). Tête, cou et ventre blancs. De Rio-Janeiro, de l'Ascension.

Jeune male (*Pelecanus palmerstonii* Lath.) ? Tête et cou noirs : ventre blanc.

Jeune femelle (*Pelecanus minor* Lath). Tête et cou roux vif : duvet épais et abondant : corps noir. De Timor, des îles Mariannes.

Observ. On ne peut guère, dans le moment actuel, admettre qu'une espèce de frégate, qui varie suivant les sexes et l'âge, parce que les moyens de comparaison manquent dans les Musées. Cependant nous avons rencontré dans les îles Carolines une petit frégate toute noire, de taille moitié moindre que celle de l'espèce des côtes du Brésil.”

From this extract I deduce that “*Fregata caroliniana* Less.” would have been conferred upon this small species, and therefore would not be a synonym of *A. aquilus*, as cited by Gray.

In the *Birds of the U.S. Expl. Exped.* 1858, Cassin admitted two species, writing :

p. 358. “*Tachypetes aquila* Linné. Though no specimen of this species is in the collection, it is frequently mentioned by the naturalists attached to the Expedition. This species is that which is found on the shores of the Atlantic Ocean, from the coasts of the Southern United States and of the West Indies, thence throughout the entire extent of South America to Cape Horn. Its further range is yet undetermined, the species which is the subject of our next article having universally but erroneously been regarded as identical with the present bird by modern ornithologists and voyagers. The bird now before us is the largest of the species of this genus, and may readily be distinguished from others by this character, though in general form and in colors there is almost complete similarity. In this bird the primary-quills and feathers of the tail are remarkably wide, and the shafts strong.

THE BIRDS OF AUSTRALIA.

p. 359. "*Tachypetes palmerstoni*. The Frigate Pelican of the Pacific.

"Form—Generally similar to *Tachypetes aquila*, but rather smaller, and with the quills and feathers of the tail comparatively narrow. Wing $21\frac{1}{2}$ in. Tail $15\frac{1}{2}$ in. Bill from gape to tip of upper mandible $4\frac{1}{2}$ in.

"Color. Adult male. Entire plumage black. . . .

"Female. With a bare space on the throat, but without the gular pouch. Breast white. Other parts of plumage as in the male. Slightly larger than the male (?)

"Young. Head and neck white, strongly tinged with fulvous, especially on the neck in front above the breast. Abdomen white: breast black. Entire upper plumage of the body, the wings and tail, black. Shoulder and some of the coverts of the wings paler and edged with ashy-white.

"This species, which we have no hesitation in concluding to be that indicated by Gmelin and Latham, as above cited, appears to be exclusively an inhabitant of the Pacific Ocean and its islands. In the collection of the Expedition there are numerous specimens according with each other exactly in their specific characters, and readily distinguishable from the well-known species of the Atlantic Coast."

These observations seem to have been ignored but never refuted.

In the *Ibis* 1859, p. 152, G. C. Taylor, having visited an island in Fonseca Bay, Pacific Coast of Honduras, wrote:

"I observed that the Frigate birds were of three different plumages. As there were birds of all three sorts sitting together, and with their nests in the same bushes, I concluded that they were of one and the same species—males, females, and immature birds. Some have the head and neck white, the beak white, the feet and legs bluish-white, the belly white and the wing-coverts greyish-brown. Others have the legs and feet black, and are black all over, with a greenish metallic tinge on the back. These have a bright scarlet pouch, which they inflate to the size of an ostrich's egg while on the wing. The boatmen informed me that these were the male birds. Others, probably immature birds, had the head black, the throat white, and the legs and feet pink. All had long, black, forked tails."

Hartert, dealing with birds he himself collected in the Caribbean Sea under the name *Fregata aquila* (*Ibis* 1893, p. 308), commented:

"Schlegel (*Mus. d. Pays-Bas*), Oates (*B. Brit. Burm.*) and others are of opinion that the white-breasted specimens of this species are young birds, but Ridgway (*B. N. Amer.* and *Man. N. Am. B.*) has already well described the plumage of the adult female as well as that of the young, which has the whole head white. My male example agrees perfectly with specimens from

GREATER FRIGATE BIRD.

the Pacific and Madagascar.* The females have much larger bills than the males. My specimens measure:—

♂ ad.	Aruba 3 VII.	Culmen 5.2 inches	wing 23.6	tail 17.
♀ ♀ ad.	do.	„ 5.5-5.6 „	„ 23-24.5 „	„ 15.5.

“* Hartlaub (*Vögel. Madagascars*, p. 399) mentions only *Fregata minor* from that island, but examples of both these very distinct species have been recently received by the Tring Museum from Madagascar.”

Apparently Ogilvie-Grant independently worked out the differences between *Fregata aquila* and *Fregata ariel*, as he does not mention that Ridgway had published the facts previously and does not give a reference to Ridgway's paper in his synonymy. For three years before the *Catalogue of the Birds in the British Museum* was published, Ridgway (*Proc. U.S. Nat. Mus.*, Vol. XVIII., p. 525, 1895) had written: “*Fregata aquila minor* (Gmelin) ? . Since no specimens were collected, and as Dr. Abbott did not distinguish between the two species, it is uncertain whether the Frigate birds observed at Glorioso were this form or *F. ariel* Gould.”

On p. 516 he admitted: “*Fregata ariel* Gould, one specimen, Ile St. Joseph (Amirantes).”

“The name *ariel* Gould having been quite generally cited as a synonym of *minor* Gmelin, it is proper that I state here my reasons for reinstating it as a specific name. A reference to Gmelin's diagnoses and the descriptions and figures upon which it is based proves beyond question that the name *minor* belongs to the small intertropical form of *F. aquila*. The bird under consideration is unquestionably a distinct species from *F. aquila*, being readily distinguished from the small form to which the name *minor* belongs by several very positive characters, involving not only differences of coloration but of form and dimensions also. . . .

“The characters of *F. ariel* are as follows: ‘Much smaller than *F. aquila minor* with very much shorter and slenderer bill and smaller feet. Adult male with a transverse patch of white on each flank.’ ”

These characters are drawn up from details of Gould's types supplied to Ridgway by Witmer Stone, which are given.

The Amirantes specimen measured, according to Ridgway: “Wing 20, tail 13, culmen 3.30, middle toe 1.80 inches.”

Also, in 1897, Ridgway, dealing with the Birds of the Galapagos Archipelago, reported in the *Proc. U.S. Nat. Mus.*, Vol. XIX., thus:

“p. 590. *Fregata aquila* Linnæus.

“Range: Intertropical and subtropical seas in general: Galapagos Archipelago. No special locality (Darwin, Kinberg); Chatham, Barrington, Tower and Bindloe Islands (Baur and Adams).”

THE BIRDS OF AUSTRALIA.

“ p. 591. *Fregata aquila minor* (Gmelin).

“ Range: Central Pacific and Indian Oceans. Accidental (?) in the Galapagos Archipelago; Tower Island (Baur and Adams).

“ (*Attagen ariel* Gould. A perfectly distinct species, easily recognised by the white flank patch of the adult male and other perfectly obvious characters.)

“ One specimen of this smaller form, an adult male, was obtained at Tower Island, September 3, 1891, by Messrs. Baur and Adams.

“ Besides being considerably smaller, this bird differs from the three examples of true *F. aquila* in coloration, the plumage being much more glossy, and the metallic coloring of the back and scapulars brilliant green mixed with a little purple, instead of just the reverse.

“ The lesser wing-coverts also have a large area of dull brownish feathers, running parallel with the anterior border of the wing, there being no trace of such coloration in the three specimens of *F. aquila*.

“ The measurements of this specimen are herewith given, as well as those of three adult males of true *F. aquila* from the Galapagos and an equal number (the smallest of six) from the Bahamas.

ad. ♂ Tower I. Gal.	..	Wing	22.80	tail	14.60	culmen	3.82	mid. toe	2.06.
ad. ♂ Tower I. Gal.	..	„	25.70	„	18.75	„	4.38	„	2.18.
ad. ♂ Barrington I. Gal.	„	„	25.51	„	18.80	„	4.38	„	2.15.
ad. ♂ Barrington I. Gal.	„	„	24.30	„	18.00	„	4.05	„	2.05.
ad. ♂ Key Verd, Bahamas	„	„	23.75	„	18.00	„	4.20		—
ad. ♂ Key Verd, Bahamas	„	„	24.10	„	17.75	„	4.30	„	2.10.
ad. ♂ Key Verd, Bahamas	„	„	24.45	„	18.75	„	4.12	„	2.05.

“ Whether or not *F. aquila minor* be worthy of recognition as a separate form from true *F. aquila*, there can be no question as to the fact that it was upon this form that Gmelin's *Pelecanus minor* was based. It is equally certain that the name *Attagen ariel* Gould, so generally quoted as a synonym of *F. minor*, does not at all belong to the latter bird, but to a very distinct species inhabiting the seas between Africa and Australia (and doubtless elsewhere). *F. ariel* is still smaller than *F. a. minor*, very much more slender, and differs further in several very conspicuous colour-characters, amongst which may be mentioned a large white flank-patch of which there is no trace in either *F. aquila* or its smaller form.”

A couple of years later Rothschild and Hartert gave a Review of the Ornithology of the Galapagos Islands (*Nov. Zool.*, Vol. VI., 1899), and at p. 175 wrote the following under the title *Fregata aquila* L.:

“ Ridgway and Grant have quite correctly accepted the name *F. ariel* for the small species found in the South Pacific and Indian Oceans, from

GREATER FRIGATE BIRD.

Madagascar to Australia and the Society Islands, and recognised *F. minor* (*Pelecanus minor* Gmelin) as given to small specimens of the common large species *F. aquila* (L.). On the other hand Ridgway (*l.c.*) raises the question whether *F. aquila minor* is worthy of recognition as a separate form from true *F. aquila aquila* or not. If so, the small form would be an occasional visitor to the Galapagos, while *F. aquila aquila* would be of regular occurrence according to Ridgway.

“Our material from the Galapagos proves that the SMALL form is resident, and we think it proves also that the large and small form completely intergrade in the same colonies, and therefore they are not separable as subspecies.

“On Culpepper, Wenman, Tower, Gardner and Hood Islands they were found breeding. On Indefatigable, Duncan, Jervis, James, Chatham, Barrington, and Albemarle Islands they were found to be common, and they were also seen on Abingdon, Charles, Bindloe, and Narborough Islands. The *males* vary in the two principal measurements as follows:

“♂ ad. Culpepper. Bill from gape to tip in a straight line, 116, 112, 110 mm.; wing 580, 580, 548 mm.

“♂ ad. Barrington. Bill, as above 125, wing 645 mm.

“♂ ad. Tower. Bill, as above 130, wing 660 mm.

“♀ ad. Culpepper. Bill, as before 135, wing 600, 610 mm.

“♀ ad. Wenman. Bill, as before 158, wing 690 mm.

“It is evident, and known, that the *females* are, as a rule, much larger than the *males*, but the Wenman *female* is a very large specimen.

“The following note is on the label of this large *female*: ‘Wenman Island, ♀, August 4th, 1897. Length 42.50 in., extent 96 in. Iris dark brown, feet madder red, tarsi paler, bill horn-colour, gular-sac and eyelids indigo blue. This bird is coloured entirely different from anything seen so far.’ We do not find anything extraordinary in these notes, the *males* only having a red gular-sac, this being blue in the females. The differences stated by Ridgway to exist in coloration, viz., that in the smaller birds the plumage is more glossy and the back brilliant green mixed with purple—instead of the reverse—do not hold good, and are merely of an individual character.”

Later, concerning the same avifauna in the same Journal, Vol. IX., 1902, the same authors add under the name *Fregata aquila* L., p. 405: “We have again received very large intermediate and comparatively very small individuals from the Galapagos Islands, and can thus corroborate our former statement that the large and small specimens of the Frigate-bird cannot be separated as two distinct subspecies. The bills of our Galapagos birds measure from 9 to 11 cm., and the wings from 56 to 66 cm. On the other

THE BIRDS OF AUSTRALIA.

hand, *Fregata ariel* (Gould) must be kept specifically distinct. Dr. Finsch, in a very interesting popular article in the *Ornithologische Monatsschrift*, 1900, p. 452, declares that his studies have convinced him that there is only one species of *Fregata*; but he is entirely mistaken. Either he did not see the difference, or the museums in which he made his studies had no specimens of the small form. The latter is of a much more southerly distribution, except in Borneo, not going as far as the Equator; it is smaller, the largest specimens just reaching the very smallest exceptional ones of *F. aquila*; THE MALE HAS ALWAYS A LARGE WHITE PATCH ON EACH FLANK. The females and young of the two do not seem to differ conspicuously in colour. The alleged distinctness of having a white collar (*ariel*) or not (*aquila*) is not borne out by our series."

In criticising the above, it must be remembered that the idea of geographical isolation producing peculiar forms of such wide-spread species as the present was scarcely conceived. Secondly, Rothschild and Hartert in 1899 had not the full experience of Ridgway in 1897, and thirdly, their knowledge of the literature was not complete. These apologies must be made, as their statements are generally inaccurate, as will be fully shown later. In the meanwhile, with regard to *ariel* not going north of the Equator, Ogilvie-Grant had catalogued specimens from Hakodadi and Amoy, while I have noted that Lesson observed a small Frigate-bird at the Caroline Islands.

In the *Monograph of Christmas Island*, Sharpe (p. 42) recorded *Fregata aquila*, observing: "According to Mr. Andrews, who shot some breeding birds, the male of the large Frigate-bird is almost entirely black, being white only from the lower breast down to the vent, including the lower flanks and upper-parts of the thighs. The female is black above, and has the throat black, but is white from the lower throat downwards; the sides of the body black, with a large white patch on the flanks. The young birds have a rusty coloured head and throat."

On p. 44 he included *Fregata ariel*, writing: "According to Mr. Andrews, the male is entirely black below, but the female is white on the throat, breast, and sides of body. The centre of the lower breast, abdomen, and lower flanks are black."

Although these colorations disagree with those given in the *Catalogue of Birds*, the discord appears to have escaped notice up to the present time.

With regard to the Galapagos birds, Snodgrass and Heller (*Proc. Wash. Acad. Sci.*, Vol. V., pp. 231-372, 1904) dismiss the present bird thus:

"*Fregata aquila* Linnæus.

"Range. Intertropical and subtropical seas. Galapagos Islands. Common everywhere about the archipelago: observed at all the islands.

GREATER FRIGATE BIRD.

Found nesting on Culpepper and Wenman in December, and on Tower in June."

Nicoll, in the *Ibis* 1906, p. 673, from South Trinidad, Atlantic Ocean, admitted *Fregata aquila*, writing: "The Great Frigate bird is very common on South Trinidad, but was not breeding at the time of our visit (January)."

On p. 691 he added Glorioso, Indian Ocean, as a habitat of *Fregata aquila* Linnæus, commenting: "The Large Frigate bird is subject to much variation in size in different parts of the tropical Atlantic, Pacific, and Indian Oceans, especially as regards the dimensions of the bill. I can, however, see no other difference."

In Rothschild's *Avifauna of Laysan* no discussion was given, as no specimens were at hand, and Fischer in the *Bull. U.S. Fish. Comm.*, Vol. XXIII., pt. III., 1903, made no comment on the same faunal specimens.

In the *Ibis* 1909, p. 326, Dr. P. R. Lowe gave the following interesting account of birds breeding on the Los Hermanos Islands, off Venezuela:

"The commonest form of plumage which we noticed was that in which the head, neck, nape, and back were all black, relieved by a beautiful greenish-purple sheen, the throat and thorax being white. Next came a form in which the head, neck, nape, and breast were entirely white, while infinitely the rarest variety was that in which the head and neck were black, but the throat exhibited the conspicuous and remarkable red gular pouch. The first stage consists apparently of both young males and females, the next of older females, and the last of old males. I saw all three varieties incubating. So far as I have been able to observe, it is only the fully adult male that exhibits the extraordinary balloon-shaped pouch, which it can distend at will. I, however, noticed some birds, apparently not *fully*-adult males, with *orange* gular-sacs, and some, apparently still younger males, with the white throat and breast mottled and streaked with black, in a stage antecedent to the perfectly fully-adult male. These appeared to have no distensible gular-sac, or at any rate it was not apparent. The fully-adult males were very shy, and I could not get near enough to take photographs of the few I found sitting on nests. As we reached the top of the island (650 ft.) some of these old males were soaring against the strong trade-wind just above our heads. The vivid red, almost translucent and distended pouch, waggled about in the breeze in a somewhat ludicrous way. It appears to have a constricted and elongated neck which allows it to 'flop about' in an apparently purposeless manner."

Study of the preceding will show that no effort has been made to fix subspecies in any way, and when Ridgway indicated differences these were inaccurately minimised by Rothschild and Hartert. Further, the discrimination of the Linnean and Gmelinian names is not easy, and somewhat arbitrary

THE BIRDS OF AUSTRALIA.

procedure must be adopted. As above noted, Ascension Island must be accepted as the type locality of Linne's *Pelecanus aquilus*. *The Ascension Island bird, as will hereafter be proven, is SPECIFICALLY distinct from all the birds commonly known under that name.* This conclusion necessitates the usage of some other name. *Fregata ariel* Gray is, as generally admitted, quite a distinct species. *Pelecanus minor* Gmelin, from unknown locality, is the next name in order. As pointed out, this name is based absolutely on Edwards, and Edwards' figure is a very accurate one, for his time, of an adult female of the widespread bird. Although Gmelin wrote "2 pedes 9 pollices longus" as against "*Pelecanus aquilus* 3 pedes longus," Brisson wrote, "deux pieds neuf pouces neuf lignes," and this seems to be the French equivalent of Edwards' measurement, which reads: "The original was a stuffed skin: from bill-point to tail end it measured thirty-six inches," while he added: "I suppose this may be the female bird, for, since I drew it, I have been told by a gentleman who has made several voyages to the East Indies that the feathers of the males of this species are wholly black."

As no locality whatever is given, an arbitrary type locality must be selected. There is nothing whatever in the description to guide one, so that considering the localities cited by Buffon, I would select Jamaica, and thus fix the name upon the bird breeding in the Caribbean Sea.

This will be a fairly accurate disposition, but the unfortunate usage of *minor* as the species name for the well-known bird which has a range over the whole tropical and subtropical seas in varied subspecific forms cannot be but regretted.

In the British Museum there is preserved a good number of these birds from varied localities, and at the Rothschild Museum, Tring, about an equal number of most valuable specimens are available. As always, the Hon. Walter Rothschild has given me free access to this magnificent series, for which the thanks of all working ornithologists, as well as my own, must be tendered. I have often found that the Rothschild Collection complements the British Museum one in a most remarkable way, and this group has provided another striking example, as I there found full series from the Galapagos Islands, Laysan and the Seychelles, localities furnishing few or no specimens in the British Museum Collection.

I see little use in recording the number of specimens examined, but as some workers comment upon the lack of such data, I might note that I did not count the skins handled, but I made notes on more than one hundred and fifty and left many immature without comment, so that probably about two hundred and fifty birds have been criticised in this case.

GREATER FRIGATE BIRD.

Firstly, in the British Museum, there are eight birds from Ascension Island: they provide a complete series from downy young to fully adult, and show that Ascension Island harbours a bird quite different from any elsewhere found.

The downy young is white: a young bird showing down still adhering has the *head and neck all round and upper-breast pure white; no rust coloration whatever is observed*; two other young ones with wings well grown show *exactly* the same coloration. Three birds with breeding pouches marked males are all black throughout: they have no white flank-feathers, nor do they show any dull brownish bar on the wing. Another bird, sexed by the same collector as a female, is *wholly black*, the upper-breast having a brownish tinge, the collar at the back of the neck being not so dark, while there are no lanceolate breeding-plumes on the back *nor is there any nuptial pouch*. The sexing seems absolutely correct, and consequently in this form the sexes are *both* wholly black and the young is *white-headed*. No other locality has yet produced such a peculiar combination, so that this must be regarded as a distinct species.

The common widespread species known under the name *Fregata aquila* undergoes complex plumage changes as follows:

- Nestling.* Pure white down.
- Next stage.* Scapulars and mantle of brown feathers with subterminal bars; round the eyes, over fore-head and chin naked.
- Next.* Red down comes on the naked part of the head but not on the chin; secondaries commence as black feathers.
- Next.* Larger, and tail-feathers begin black.
- Next.* The red extends over the top of the head and on to the face; the scapulars are fully developed and the feathers of the back growing: these are dark brown with lighter tips. The tail has rapidly lengthened, being 150 mm. long and showing slight but decided fork, their feathers being black with a blue sheen; the wing-coverts are more or less greyish-white throughout, the primaries and secondaries long and black with a metallic sheen; the breast-feathers just beginning to show.
- Next.* Larger and similar to preceding; the tail, more forked, measures 214 mm.; the head is darker and the dark breast-feathers show more prominently, but otherwise the under-parts are still covered with down.

THE BIRDS OF AUSTRALIA.

Flying young. Head nearly all white, with a few red feathers remaining; upper-breast dark rusty red; brown on sides of body; abdomen white; vent black.

Immature. The patch of dark rusty red on the upper-chest vanishes and the dark colour goes from sides, but immediately black feathers begin to be seen on the abdomen.

These notes are taken from a series in the Rothschild Museum collected by Schauinsland at Laysan. From other localities intervening stages can be seen. The adult male is wholly black, with lanceolate breeding-plumes on the back showing strong metallic gloss. The adult female has the breast white, the throat not fully black and no breeding-plumes, though a metallic sheen is noticeable on some of the back feathers; she is larger and has no gular pouch. Immature males show this coloration, but are distinguishable by the possession of an orange gular pouch and the presence of lanceolate metallic breeding-plumes. It is also certain that the immature of both sexes breed when in the white-headed stage noted above, but then the male has only a partially developed pouch and scarcely differs from the female save in size.

This description is of the bird commonly known as *Fregata aquila*, but which must now be known as *Fregata minor*.

The following observations show that well-marked subspecies can be recognised, and moreover have elucidated the fact THAT THIS BIRD IS NO WANDERER, but is very local, rarely going far from its breeding-ground. Consequently, when this fact is fully grasped and long series are procured, very many subspecies will be determined.

In this place I cannot define many, as series are not available, but the facts prove that the Galapagos Archipelago, as indicated but not proved by Ridgway, harbour two perfectly distinct subspecies. Moreover, these two subspecies are easily separable from the bird breeding at Laysan, geographically the nearest breeding locality.

It may be as well to deal with these first, as they appear to be the most interesting. *My notes were taken at the Rothschild Museum before I had seen either Ridgway's account of the Galapagos birds or Rothschild and Hartert's criticism.*

It is important to emphasize this statement, as I confirm absolutely Ridgway's conclusions from examination of the material upon which Rothschild and Hartert based their criticism, which I find to be incorrect. Galapagos Archipelago, Barrington Island ♂. All black, narrow lanceolate breeding-plumes on back showing purple sheen; wing-coverts show this sheen also. Culmen 109 mm., wing 649, tail 510, middle toe 51.

GREATER FRIGATE BIRD.

Tower Island or Indefatigable Island. Coloration as in preceding exactly. Culmen 113 mm., wing 660, tail 470, middle toe 52.

Albemarle Island. Coloration as in preceding exactly. Culmen 106 mm., wing 646, tail 510, middle toe 53.

That is, three birds from *Barrington, Tower and Albemarle Islands*, all males showing narrow purple breeding-plumes and no bar on the wing, measure—culmen 106-113 mm., wing 646-660, tail 470-510, middle toe 51-53.

Culpepper Island ♂. All black, with gular pouches prominent, broad breeding-plumes on back showing a prominent oily green metallic coloration, quite different from the purple above noted. There is a noticeable bar of brownish, parallel to the shoulder of the wing, on the wing-coverts. Culmen 93 mm., wing 580, tail 400, middle toe 50.

Culpepper Island ♂. Identical in coloration. Culmen 89 mm., wing 550 +, tail 370, middle toe 50.

Culpepper Island ♂. Identical in coloration. Culmen 90 mm., wing 578, tail 390, middle toe 48.

Wenman Island ♂. Identical in coloration. Culmen 91 mm., wing 580, tail 370, middle toe 48.

That is, four birds from *Culpepper and Wenman Islands*, all males, showing broad oily green breeding-plumes and a brownish bar on the wing, measure—culmen 89-93 mm., wing 550-580, tail 370-400, middle toe 48-50.

If these figures be contrasted with the preceding, *no gradation is observed in the measurements*, the figures being remarkably distinct.

It is obvious that the bird breeding on Culpepper and Wenman Islands is much smaller in every way, as well as being somewhat differently coloured, than the birds breeding on Barrington, Tower and Albemarle Islands. When Ridgway separated the two forms he had only Tower and Barrington Islands breeding birds, which were large birds, and the solitary small one he had was from Tower Island: it was certainly a straggler from the northern islands of Culpepper and Wenman, and Ridgway marked it as accidental (?) to the Galapagos, being ignorant of the northern breeding place. When Rothschild and Hartert received the small birds from the two northern islands they did not recognise this fact, as they were under the impression that all the Frigate birds classed under *F. aquila* (*ariel* being admitted as distinct) must be alike. They wrote that Ridgway's distinction as to the metallic coloration of the breeding-plumes did not hold good. This is purely an error, as I observed the distinction in the specimens and noted it down, *ignorant of Ridgway's prior record*. They also claim to have received

THE BIRDS OF AUSTRALIA.

intermediate specimens: the Rothschild Museum at this time does not possess any, and to quote their own measurements—it will be seen that mine taken from the same birds disagree—they measured thus:

Culpepper ♂ add.	..	..	Bill 110-116	Wing 548-580 mm.
Barrington & Tower ♂ add.	..	..	125-130	645-660
Culpepper ♀ ad.	..	..	135	600-610
Wenman ♀ ad.	..	..	158	690

These figures do not show any overlapping when sexes are compared, for females are much larger than males. I believe their misunderstanding of the matter was due to their misinterpretation of the Wenman female. Though Harris noted it as a strange bird, and they quote his memo. in full, they did not recognise that this was a straggler from the southern islands and was consequently a female of the large race. When this is understood the matter becomes very simple. Stragglers may rarely be met with in each other's territory, but the forms are so distinct that they can be recognised at a glance.

Neither of these forms agree with the West Indian birds, which must be regarded as typical *Fregata minor*, as they pass through the same plumage-changes, and of which they must be regarded as well-differentiated subspecies.

The nearest breeding-locality from which I have seen series is Laysan, Sandwich Islands. A note with regard to the fully-adult black males may be here interposed. From some localities they are commonly secured, while from others they appear to be almost unprocurable. I have noted that some observers record the fact that they are very rare and wary. In the Rothschild Museum a fine series of Laysan birds are preserved, and I have noted only one black male, two immature males, two mature females, as well as a series of immature. Another black male and two females unlabelled, save with a number, were also said to have come from there and they agree.

The black male shows a dusky band across the breast and a faint dusky bar on the wing; the metallic coloration is mixed oily green and purple on the back; the gular-pouch blood-red. It measures—culmen 110 mm., wing 595, tail 395, middle toe 52.

Two breeding males have orange gular pouches and are in female plumage, but show lanceolate shining breeding-plumes: these measure—culmen 102-105 mm., wing 584-588, tail 375-390, middle toe 50.

This suggests that these birds increase in size with age, as it will be observed the wholly black bird is larger than the two breeding immature plumaged males. The females seem in the present case to be little larger than the fully adult male, but it may be that these are small females: two

GREATER FRIGATE BIRD.

breeding adults measure—culmen 111-117 mm., wing 595-597, tail 395, middle toe 52. A young female in moult has the tail 420 mm. in length. The females have not the throat fully black, but the feathers have ashy tips.

When these figures are compared with those given by Galapagos birds they are seen to differ appreciably.

To tabulate the figures:

Culpepper Island—	Culmen.	Wing.	Tail.	Middle toe.
Galapagos ♂.	89-93	550-580	370-400	48-50 mm.
Tower Island, etc.—				
Galapagos ♂.	106-113	646-660	470-510	51-53
Laysan ♂.	102-110	584-595	375-395	50-52

Inasmuch as the Laysan birds have large bills almost agreeing with the large Galapagos birds, while their wing length approximates more closely with those of the small Galapagos birds and differ in details of coloration from both, they must be regarded as a distinct subspecies.

Gmelin's *Pelecanus palmerstoni* was described from Palmerston Island, Pacific Ocean, and it is remarkable that probably since Cook's time no further specimens have been collected at that locality. Consequently no series are available, but that a form of *minor* does occur in that neighbourhood is certain. The race which would bear the name cannot be defined, as only two immature unsexed birds are available. These give the following measurements: culmen 109-111 mm., wing 580-590, tail 345, middle toe 48-55.

These figures approximate somewhat to those of the preceding, but in view of the facts produced by the study of the Laysan and Galapagos series it is impossible to associate either with the name *palmerstoni*, and this must be used for an indeterminate (at present) subspecies. Montrouzier's *Tachypetes chambeyroni* would be cited as a doubtful synonym, as no series either from Huon or Surprise Island are available, and we cannot guess as to the nature of the form inhabiting those islands.

However, *Fregata aquila palmerstoni* cannot be used for the Australian bird, as I have shown first that *aquila* must be discarded as the species name, and I now dismiss *palmerstoni* as the subspecies name.

Apparently the large form of *Fregata* is a rare straggler in Australian waters and I have seen no specimens absolutely procured in Australia. Gould states he commonly received them from Torres Straits, but no mature specimens are in the British Museum from his Collection. The one enumerated in the *Catalogue of the Birds in the British Museum* as from Raine Island, North-east Australia, has no original label on, and the locality appears to have been added probably because the little birds came from that locality.

THE BIRDS OF AUSTRALIA.

Two "adult males" ex the Godman Coll. with the data "Queensland" pencilled on and enumerated in the *Catalogue of the Birds in the British Museum* as "Queensland Coast (J. T. Cockerell)," are obviously skins made by that collector. The locality is, of course, very doubtful, but it is certain they were procured at no great distance, probably on one of the islands of Torres Strait. Macgillivray, on the voyage of H.M.S. "Rattlesnake," procured an immature male on Oomaga Island, Torres Straits, which suggests a breeding locality.

The two "Queensland" males measure: culmen 100-105 mm., wing 550-565, tail 370-420, middle toe 50-55. These figures do not agree at all well with the immature birds credited to *palmerstoni*, for allowing them to be females the discrepancy in wing measurement is too great.

I now come to the Christmas Island (Indian Ocean) birds, which really induced this detailed investigation. Dr. C. W. Andrews, F.R.S., generously gave me four birds from that locality, male and female of the large bird, and male and female of the small bird, he found breeding on the island.

These were identified by Dr. Bowdler Sharpe as *Fregata aquila* and *F. ariel*, but he gave notes which negatived both the associations. For he observed, or rather quoted Dr. Andrews' notes, that the large bird, as regards the male, had a white belly, while the female was white from the lower throat downwards. No other observer had recorded such a coloration and no other birds showing this were preserved in the British Museum. For "*F. ariel*" he again quoted Dr. Andrews' notes, that the male was wholly black, no mention being made of the white patch of feathers on the flanks which Ogilvie-Grant had observed to be diagnostic of this species.

Criticism of Dr. Andrews' specimens enabled me to recognise that the large bird was a new distinct species, while the small bird was a form of "*Fregata aquila*" Auct.

The measurements of these Christmas Island birds show that two distinct forms are represented without reference to the coloration—

				Culmen.	Wing.	Tail.	Middle toe.
♂ ad.	..	..	..	112.5	605	384	54 mm.
♂ ad.	..	..	..	113	600	400	56
♂ ad.	..	..	..	115	625	375	60
♂ imm.	..	..	..	96	573	365	53
♀ ad.	..	..	..	127	643	430	60
♀ ad.	..	..	..	136	635	450	60
♀ imm., down showing	..	..	..	107	638	370	53

These are the large white-bellied birds.

GREATER FRIGATE BIRD.

♂ ad.	..	Culmen	96	wing	558	tail	365	middle toe	50 mm.
♂ ad.	..	„	96	„	530	„	385	„	53
♀ ad.	..	„	107	„	599	„	410	„	54

These are Sharpe's "*F. ariel*," and have to be compared with a series of "*F. aquila* Auct." from other localities: the larger birds need no comparison on account of their distinctive coloration. In the Rothschild Museum a large series of this bird from the Seychelles are preserved: they are all sexed, and details of soft parts given; whether these data can be faithfully accepted or not I cannot say, but in some cases errors appear to have been made.

Four adult black males measure:

Culmen	96	wing	+	tail	390	middle toe	51 mm.
„	106	„	+	„	390	„	53
„	100	„	603	„	390	„	52
„	101	„	585	„	395	„	48 +

Four in female plumage marked males measure:

Culmen	120	wing	605	tail	410	middle toe	54 mm.
„	114	„	604	„	390	„	51
„	105	„	602	„	400	„	54
„	109	„	603	„	420	„	50

One in female plumage marked female gives:

Culmen 116, wing 613, tail 420, middle toe 54 mm.

A black male from Seychelles in the British Museum measures:

Culmen 98, wing 594, tail 410, middle toe 53 mm.

It is suggested that the female is not much larger than the male from this locality, though none of the birds marked male reaches the solitary adult female in wing-length.

An adult black male, collected by Nicolls at Gloriosa, now in the British Museum, measures:

Culmen 106, wing 606, tail 400, middle toe 55 mm.

In the Rothschild Museum two birds from Aldabra measure:

♂ ad.	Culmen	99	wing	595	tail	392	middle toe	49 mm.
♀ ad.	„	115	„	621	„	430	„	50

Another bird in the white-headed stage, white underneath to the vent, has the bill rose colour, as in the full breeding-plumage: it is marked female, and measures:

Culmen 120, wing 615, tail 395, middle toe 56 mm.

THE BIRDS OF AUSTRALIA.

In the British Museum, two birds from Aldabra give :

♂ ad.	Culmen 106	wing 600	tail 400	middle toe 50 mm.
♀ ad.	„ 118	„ 605	„ 400	„ 57

I have a black male from Aldabra, the type of *aldabrensis* measuring :

♂ ad. Culmen 104, wing 600, tail 400, middle toe 50 mm.

These birds may be all associated, for the present, together as constituting a recognisable subspecies, the details of measurement agreeing fairly well.

A summary of the figures would read :

♂ ad.	Culmen 96-120 ?	wing 585-605 ?	tail 390-420	middle toe 48-54 mm.
♀	„ 116-120	„ 613-621	„ 400-430	„ 50-57

These show that the small Christmas Island bird cannot be associated with these, so that it must also be recognised as a different subspecies.

This leaves only the Atlantic Ocean birds to be dealt with. I have shown that the Ascension Island bird is a distinct species.

There is quite a long series from South Trinidad Island in the British Museum, but only one black bird is included. This is, moreover, the smallest of the lot measuring :

Culmen 98, wing 550, tail 400, middle toe 47 mm.

The remainder are immature or females, the most adult of which measure:

♀ ad.	Culmen 128	wing 600+	tail 400+	middle toe 54 mm.
♀ ad.	„ 128	„ 624	„ 447	„ 56
♀ ad.	„ 121	„ 621	„ 415+	„ 52
♂ imm.	„ 113	„ 604	„ 368+	„ 47+
♂ imm.	„ 118	„ 584	„ 400+	„ 55
♀ imm.	„ 120	„ 619	„ +	„ 52

What the solitary black male means I cannot say ; it would seem to be a straggler from some other breeding locality as its measurements disagree so much.

Omitting it for the present we get :

♀ ad.	Culmen 121-128	wing 621-624	tail 415-417	middle toe 52-56 mm.
Im. ♂	„ 113-118	„ 584-604	„ ?368-400	„ 47-55

No series appears to be available from any given locality in the West Indies or the Caribbean Sea.

The measurements of the birds in the Rothschild Collection, however, give figures disagreeing with those produced above from South Trinidad, but it is almost certain that a large series would show many subspecies to be represented in the Northern area ; at the present time I lump all these together and call them typical *Fregata minor*.

GREATER FRIGATE BIRD.

The measurements are of adult black males :

			Culmen.	Wing.	Tail.	Middle toe.
Off Point Gourde	..	..	107	635	415+	55
Do.	..	..	110	620	410	55
Barbuda Island, West Indies	..		104	647	430	50
Do.	do.	..	102	603+	435	52
Marco Island	..	..	103	630	390	48
Antigua	..	..	102	610+	445	48
Las Peñas, Mexico	..	..	111	620	325+	51
Aruba	..	..	110	592+	410	53

Females are much scarcer, and only three adults are available for measurement :

			Culmen.	Wing.	Tail.	Middle toe.
Las Peñas, Mexico	..	..	114	650	433	53+
Aruba	..	..	120	635	+	56
Do.	..	..	118	595+	360+	56

Though this may not be a homogeneous series, a valuable item may be observed from it, viz., the bill in the males never exceeds 112 mm., while the females, though only three, all exceed that measurement. All the males, save the Aruba one, which may not have completed its moult, exceed 600 mm. in wing length, one reaching 647 mm.; while of the two females which give wing measurements, one reaches 650 mm., the other 635: the latter, however, may not have completed its moult.

Thus the South Trinidad birds show absolutely a longer culmen and a shorter wing length. In the British Museum quite a number of birds have been got together from the West Indian Islands and the Caribbean Sea, but no series whatever from any given locality has yet been collected. A male and female procured together has been considered quite sufficient for every purpose. Adult specimens are available from Jamaica, Belsize coast, Honduras, Florida, Trinidad, Little Cayman Island, Antigua and St. Vincent Islands. The measurements obtained from these absolutely confirm those recorded above, the bills of the males measuring from 103 to 112 mm., the bills of three adult females giving from 116 to 122 mm.; the wings of the males range from 601 to 620, while that of the females go from 625-642 mm.

As previously noted, it may be that when breeding series are procured more than one race will be distinguished in these localities, but for the present these can be regarded as representing one form and typify the Gmelinian *minor*, the diagnostic features of which would be the culmen length in conjunction with the length of the wing.

THE BIRDS OF AUSTRALIA.

My conclusions may be summarised thus:

FREGATA AQUILA (Linné).

Pelecanus aquilus Linné, *Syst. Nat.*, 10th ed., p. 133, 1758.

Type locality: Ascension Island, Atlantic Ocean.

The description given by Linné is based only upon Osbeck, whose description is that of an immature bird. A series in the British Museum shows that the males and females from Ascension Island are both black, and the immature has a white head and neck all round.

The measurements of the birds in the British Museum are:

♂ ad.	Culmen 94	wing 582	tail 396	middle toe 46 mm.
♂ ad.	„ 92.5	„ 566	„ +	„ 48
♂ ad.	„ 92	„ 576	„ 384	„ 46

These have prominent red gular pouches.

The bird sexed female in the British Museum measures:

♀ ad. Culmen 105, wing 603, tail 390, middle toe 49 mm.

It has no pouch, and the sexing is confirmed by another bird in the Rothschild Museum which is sexed female and measures:

♀ ad. Culmen 103, wing 584, tail 390, middle toe 47 mm.

These birds have a brownish upper-breast and no prominent metallic gloss on the head; the lack of pouches and the large size make it certain that the sex has been correctly determined. In this connection it is important to observe that Latham recorded a wholly black male and female, as already quoted, and it is very probable these came from Ascension Island. The white-headed young indicate that this breeding locality harbours quite an aberrant *Fregata*, and so far I have noted no locality whence any similar birds occur.

This necessitates the restriction of *Fregata aquila* to this form with no subspecies.

Pelecanus leucocephalos Gmelin, is an absolute synonym of this name.

FREGATA MINOR (Gmelin).

This is the name to be used for the world-wide bird commonly known as *Fregata aquila* (Linné). *Pelecanus minor* Gmelin was given to Brisson's description, which is based upon Edwards. The last named described an adult female and he gave full measurements; its total length was three feet, the same as that of Linné's species, but the wing and tail were shorter as the bird was obviously in moult. Many authors have used this name (*minor*) for the small bird named *F. ariel* by Gray, but every measurement disagrees. There can be no rejection of the name, and unfortunately it has to come into use for the biggest bird.

GREATER FRIGATE BIRD.

Many subspecies are easily determinable, so that it is necessary to fix the type locality of Gmelin's species. No locality was given, and from examination of the literature no clue can be gained. I therefore arbitrarily select Jamaica.

Examination of many West Indian birds give the general measurements as follows:

♂ ad. Culmen over 100 wing 620-647 tail 390-445 mm.

♀ ad. „ 114-120 „ 635-650 „ 433

The downy young of this bird moults into a red head and neck, a black breast-band and white belly: the red head and black band vanish, leaving the head and all the under-parts white. The adult female has the head and throat black, upper-parts dark but indistinct rufous collar at the back of the neck; breast white, belly black, brown bar on the wing. The adult male is all black, the dorsal breeding-plumes glossed with purple and green, the former colour predominating; the wing-coverts are uniformly dark. In the males the bill is lead-coloured, the eyes brown, the feet black; the females have dirty light blue bills, brown eyes and bright red feet.

The plumage-changes have been detailed already, and the abstract above is simply given as a guide to the species.

The measurements given above are for the subspecies.

FREGATA MINOR MINOR (Gmelin).

West Indian Seas.

I would remark that probably more than one subspecies will be recognised later, when sufficient material is available to trace the annual sequences of plumage.

I have already given details of the birds collected at South Trinidad and have noted the aberrant nature of the solitary black male available from that locality. I suggest it is a straggler, and note that there is a breeding colony of these birds at Fernando Noronha. With this exception the birds from South Trinidad show that a different subspecies breeds there. The bill of the females of the typical subspecies vary from 114-120, the wings going 635-650 mm. From the southern locality the females have bills of 128 mm. combined with a wing of 621-624. No specimens have a rusty collar at the back of the neck.

I named this subspecies, in the *Austral Av. Record*, Vol. II., p. 118, 1914:

FREGATA MINOR NICOLLI

South Trinidad Island;

South Atlantic Ocean.

THE BIRDS OF AUSTRALIA.

As type I selected the female collected by Nicoll on the 4th January, 1906, measuring: culmen 128 mm., wing 624, tail 447, middle toe 56. Nicoll writes: "Round eye pale red; sac pinkish; bill bluish-white; tarsi and toes pinkish flesh-colour."

I have described and given measurements of birds from the Mascarene Islands which are in the collections of the Rothschild and British Museums. The sexing appears to be inaccurate, so that too much stress cannot be laid upon this.

Three Aldabra females measure:

Culmen	115	wing	621	tail	430	middle toe	50 mm.
„	118	„	605	„	400	„	57
„	120	„	615	„	395	„	56

A Seychelles female measures:

Culmen	116,	wing	613,	tail	420,	middle toe	55 mm.
--------	------	------	------	------	------	------------	--------

Three Aldabra males measure:

Culmen	99	wing	595	tail	392	middle toe	49 mm.
„	106	„	600	„	400	„	50
„	104	„	600	„	400	„	57

Three Seychelles males measure:

Culmen	100	wing	603	tail	390	middle toe	52 mm.
„	101	„	585	„	395	„	48
„	98	„	594	„	410	„	53

One Glorioso male specimen gives:

Culmen	106,	wing	606,	tail	400,	middle toe	55 mm.
--------	------	------	------	------	------	------------	--------

Details of coloration on the labels of the Aldabra birds state:

♂ Iris black, feet black, bill black.

♀ Iris black, feet black, bill lilac.

The Seychelles birds are labelled as:

Ad. ♂ Iris black, feet brown, bill brown.

Ad. ♀ Iris white and black, bill and feet rose.

Birds in female plumage marked ♂ read:

Iris brown, bill and feet violet.

The white-headed Aldabra female above noted has:

Iris white, legs bronze, bill rose.

Nicoll gives for the Glorioso bird:

Iris, bill, tarsi and toes black; pouch dull brick-red.

The males all show oil-green as the predominating sheen on the breeding lanceolate plumes, and the wing-coverts are uniform.

GREATER FRIGATE BIRD.

The measurements negative the differentiation of more than one subspecific form as inhabiting the Mascarene Islands at present, but that does not mean that such may not later be recognised. I selected as type my Aldabra specimen, collected 23rd July, 1906, and named the subspecies, in the *Austral Av. Record*, Vol. II., p. 119, 1914:

FREGATA MINOR ALDABRENSIS

Aldabra; Seychelles; Glorioso.

The figures show the

♀'s Culmen 116-120 wing 605-621 tail 395-430 mm.

♂'s ,, 98-106 ,, 594-606 ,, 390-410

If the other specimens be accepted as correctly sexed, it would mean that the bill in the male reaches 120 mm., but no increase in the wing-length.

The small bird from Christmas Island, Indian Ocean, which Sharpe mis-identified as *F. ariel*, is a very distinct subspecies.

Two males measure:

Culmen 96 wing 558 tail 365 middle toe 50 mm.

,, 96 ,, 530 ,, 385 ,, 53

While the female measures:

Culmen 107, wing 599, tail 410, middle toe 54 mm.

The general coloration is the same as is in the preceding.

I named this subspecies, in the *Austral Av. Record*, Vol. II., p. 119, 1914:

FREGATA MINOR LISTERI

Christmas Island, Indian Ocean (breeding).

I am using this name for the North Australian bird, as no specimens are available for accurate determination, the supposed Queensland birds measuring:

♂ ad. Culmen 100 wing 550 tail 420 middle toe 55 mm.

♂ ad. ,, 105 ,, 565 ,, 370 ,, 50

These figures agree fairly with the Christmas Island birds as known at present.

A black male from Malacca measures:

Culmen 93, wing 530+, tail 365+, middle toe 48 mm.

This would belong to the same subspecies.

The mid-Pacific form cannot be defined, as no series is available, though two names have been given. The only two birds are very young, yet they measure:

Culmen 111 wing 590 tail 345 middle toe 55 mm.

,, 109 ,, 580 ,, + ,, 48

THE BIRDS OF AUSTRALIA.

These figures indicate that, granted that these might be young females, the subspecies would be larger than the preceding; if they were males it would be very much larger.

Consequently, when this subspecies be determined, it will bear the name

FREGATA MINOR PALMERSTONI (Gmelin)

Palmerston Island, Mid-Pacific;

while Montrouzier's name *chambeyroni* must be cited as a synonym until series from Huon and Surprise Islands are collected and compared. I do not anticipate that the Laysan bird will be inseparable, though we have no data to decide such a question. I much prefer to accept for that subspecies the name

FREGATA MINOR STRUMOSA (Hartert)

Sandwich Islands.

I have given full details of the plumage-changes of this subspecies and also measurements previously. These show that the measurements differ appreciably from all others taken: the only race with which it might be confused is the preceding, which cannot be determined accurately. It might be here remarked that Cassin's observations with regard to the differences between *Tachypetes aquila* of the Atlantic and *Tachypetes palmerstoni* of the Pacific are absolutely confirmed when this Laysan series is contrasted with West Indian birds: the tail-feathers are noticeably narrower in the Pacific bird and the latter are also smaller. I use *strumosa* of Hartert, as in the *Katal. Vögels Mus. Senckenb.*, p. 235, 1891, that worker catalogued the type of *strumosa* Kittlitz, and then in a footnote referred to literature where Kittlitz had described in detail and figured the specimen, observing that so far as he knew the name *strumosa* had not previously been published. According to the Laws now in force, such introduction, though probably not intended as such, compels acceptance of the name.

We have now arrived back at the birds we commenced with—the Galapagos forms. It cannot now be denied that two distinct subspecies breed on that Archipelago, a larger and a smaller, the former breeding on the southern islands and the latter on the northern rocks only, Culpepper and Wenman Island. Stragglers may be met with in the islands where they do not breed, but the subspecies are so different that such can be differentiated at once, both by size and coloration. It must be obvious now that they cannot bear the names selected by Ridgway, viz. *Fregata aquila* and *Fregata aquila minor*, and as no names have yet been given to any Galapagos birds,

GREATER FRIGATE BIRD.

I proposed to name the two subspecies, in the *Austral Av. Record*, Vol. II., p. 120, 1914 :

FREGATA MINOR MAGNIFICENS

Southern Galapagos Islands (breeding)

and

FREGATA MINOR RIDGWAYI

Northern Galapagos Islands ; Culpepper and
Wenman Islands (breeding).

The description of the most magnificent form of *Fregata minor* yet discovered reads :

FREGATA MINOR MAGNIFICENS.

The adult male is all black, the head and lanceolate back plumes, which are narrow, having a pure purplish-blue metallic gloss, the wing-coverts showing this, the whole being glossy ; the only data provided is : " Iris brownish-black " and " Eyes brown." From the skin the bill is lead blue and the feet black.

The adult female (procured as a wanderer at Wenman Island) is fully plumaged with the data : " Iris dark brown ; feet madder red, tarsi paler, bill horn, gular-sac and eyelid indigo blue."

The measurements are :

♂	Culmen	106-113	wing	646-660	tail	470-510	middle toe	51-53 mm.
♀	„	134	„	704	„	528	„	56

The other subspecies I called

FREGATA MINOR RIDGWAYI,

as Ridgway recognised *exactly* the differences, though all his specimens came from the same island and his only bird of this race was a straggler.

This subspecies is much smaller than the other, has broader lanceolate plumes on the back and these are *noticeably* oily green in metallic sheen, and all show a brownish bar on the wing-coverts. The data given for males is : " Eyes brown, bill black, tarsus flesh, feet black," and for female : " Eyes brown ; bill horn, greenish-purple ; legs and feet flesh-colour, gular-sac purple " : the immature female having " Eyes brown, bill bluish, feet bluish-white."

The measurements are :

♂	Culmen	89-93	wing	550-580	tail	370-400	middle toe	48-50 mm.
♀ ad.	„	108	„	600+	„	405	„	50
♀ imm.	„	105	„	620	„	385	„	50

For comparison the Laysan figures may be cited :

♂	Culmen	102-110	wing	584-595	tail	375-395	middle toe	50-52 mm.
♀	„	111-117	„	595-597	„	395	„	52

This disposes of all the subspecies I can define of *Fregata minor* at present.

THE BIRDS OF AUSTRALIA.

I have described the large Christmas Island bird as a distinct new species in the *Austral Av. Record*, Vol. II., p. 120, 1914, as

FREGATA ANDREWSI

Christmas Island, Indian Ocean.

This species is remarkably distinguished by having in both sexes a white patch on the belly.

In addition, however, it is well characterised by the large size of the bill, the measurements reading :

♂	Culmen	112.5-115	wing	600-625	tail	375-400	middle toe	54-60 mm.
♀	„	127-136	„	635-643	„	430-450	„	60

The adult male has the head-feathers long and narrow, the lanceolate plumes of the back with a reddish-bronze sheen : otherwise all black save the belly, which is white ; the wing-coverts ashy brown with lighter tips forming a prominent band. From the skin the bill appears to be lead blue, the feet flesh-coloured.

The adult female has the head-feathers long and black with a metallic green lustre ; the feathers of the back not elongate and lanceolate but with a distinct coppery sheen ; the wing-coverts ashy with light tips, making a noticeable bar. The head and neck all round black, the chest and all underparts pure white, the under tail-coverts alone being black. From the skin the bill was deep rose colour and the feet red.

The immature appear to have the same coloration and plumage-changes as shown in *Fregata minor*.

Dr. Andrews tells me that Frigate Birds are present all the year round at Christmas Island. This appears to be the case at every other breeding locality, *showing as a matter of fact that these birds are resident and wander to a very slight degree.*

My conclusions are, therefore, that *four* species of Frigate Bird exist, viz. :

FREGATA AQUILA (Linné).

Restricted to Ascension Island.

(No subspecies.)

FREGATA MINOR (Gmelin).

World-wide ; in the Atlantic, Indian and Pacific Oceans, in the Tropics and Subtropics ; with many easily differentiated subspecies.

FREGATA ANDREWSI Mathews

Confined to Christmas Island Indian Ocean.

(No subspecies.)

GREATER FRIGATE BIRD.

FREGATA ARIEL (Gray).

Occurring in Atlantic, Indian and Pacific Oceans, but much rarer than *Fregata minor* (Gmelin), but subspecies are recognisable.

The immature bird figured and described was collected at sea off New Zealand, in April, 1913, and the adult is the type of *listeri*.

The preceding account was prepared and sent to the printer, when it occurred to me that a short note on the species name would be appreciated by Ornithologists. I therefore exhibited at the meeting of the British Ornithologists' Club, held on the 9th December, 1914, specimens of three of the forms above mentioned, and these excited so much interest that I was compelled to publish a synopsis of my work in the *Austral Avian Record* in order to prevent complications.

In the *Bulletin of the British Ornithologists' Club*, Vol. XXXV., pp. 36-37, Dec. 29, 1914, appears the following account: "Mr. Gregory M. Mathews also exhibited three new Frigate-Birds and made the following remarks: 'An examination of the birds known as *Fregata aquila* for my *Birds of Australia* has shown that three distinct species have been confused under that name.

'*Pelecanus aquilus* Linné, *Syst. Nat.*, 10th ed., p. 133 (1758), is based upon a specimen procured by Osbeck at Ascension Island, which has generally been accepted as the type locality. It has been overlooked, however, that the bird found on Ascension Island is a very different species from that commonly known by the name of *Fregata aquila*. In the Ascension Island species the male and female are both black, and the immature bird from the downy nestling onwards has a white head and neck. This species appears to be restricted to Ascension Island.

'The adult male of the common widespread species is black throughout, but the adult female has the lower breast and sides of the belly white: the rest of the plumage resembles that of the male, but is duller. The downy nestling has the entire head and neck rusty-red. This disappears later, and in the next phase the bird assumes a white head and entirely white under-parts, in which stage the birds sometimes is [*sic*] said to breed. The first name certainly applicable to this bird is *Pelecanus minor* Gmelin (*Syst. Nat.*, p. 572, 1789). In the *Austral Avian Record*, Vol. II., No. 6, various forms of *Fregata* are described. Many subspecies are easily recognisable, and these will be fully elaborated in my *Birds of Australia*.' "

THE BIRDS OF AUSTRALIA.

I here reprint what appeared in the *Austral Avian Record*, Vol. II., No. 6 (pp. 117-121), Dec. 19, 1914, so that the reader can contrast it with the detailed account given above.

"ON THE SPECIES AND SUBSPECIES OF THE GENUS *FREGATA*.

BY G. M. MATHEWS.

Two species of *Fregata* are admitted in the *Catalogue of Birds in the British Museum*, Vol. XXVI., under the names *Fregata aquila* and *Fregata ariel*. No subspecies are recognised, but the most superficial examination showed that such could be determined. Criticism of the British Museum material in order to fix the correct names to be used for the birds occurring in Australia has brought to light much of more than local interest. Details will be given in full in my *Birds of Australia*, and this preliminary synopsis is here given for the purpose of protecting my work, the first work on the subject for over ten years.

The most interesting discovery was that the widely-used name *Fregata aquila* was inapplicable. This was based on *Pelecanus aquilus* Linné (*Syst. Nat.*, Ed. X., p. 133, 1758).

Linné's bird was from Ascension Island collected by Osbeck. In the British Museum there is a series from that locality and the male and female are all black with the immature, even in the downy stage, with a white head showing no rust colour.

This peculiar bird is confined to Ascension Island and no subspecies are known to me. The Hon. Walter Rothschild generously allowed me to examine his fine collection of these birds in the Tring Museum and I have confirmed my results by means of his material. The common widely-spread species known as *Fregata aquila* must then bear the name *Fregata minor* Gmelin. This is very unfortunate, but there is no other conclusion possible.

Gmelin (*Syst. Nat.*, p. 572, 1789) described *Pelecanus minor*, and all the references are derived from the Man-of-War Bird of Edwards' *Gleanings*, pl. 309. The figure is a good one of a female and Edwards states this may be so as he has heard the males are all black. No locality is given nor is any determinable from the context. After due consideration I therefore designate Jamaica as the type locality of Gmelin's species.

A series from South Trinidad Island show that the bird resident there has a longer bill but a shorter wing measurement. Differences in coloration, though apparent, cannot be definitely fixed at the present time. The largest female (females are larger than males) gives culmen 128 mm., wing 624 mm., while the largest measurements from anywhere in the West Indies,

GREATER FRIGATE BIRD.

Caribbean Seas, etc., are in the female, culmen 120 mm., with the wing 650 mm.

I name this form

FREGATA MINOR NICOLLI, subsp. n.

From the Seychelles, Aldabra, Gloriosa, etc., the islands comprising the Mascarenes, another subspecies can be recognised, the largest measurements of a female being culmen 116 mm., and wing 621 mm. These birds vary somewhat among themselves, so that it may be two or more subspecies will later be recognised from this group. I propose to name this subspecies

FREGATA MINOR ALDABRENSIS, subsp.,

selecting *Aldabra* as my type locality.

From Christmas Island, Indian Ocean, Dr. C. W. Andrews gave me specimens of the two species he found breeding there and which had been identified by Dr. Sharpe as *Fregata aquila* and *Fregata ariel*. The former is a distinct new species, hereafter described, while the latter is a form of *Fregata minor*. It is very small, however, and the female only measures culmen 107 mm., with wing 599 mm.

I name this form

FREGATA MINOR LISTERI, subsp. n.

In the South Mid Pacific probably quite a distinct form exists which will bear the name

FREGATA MINOR PALMERSTONI Gmelin.

This cannot be accurately defined as no series are available from the type locality of Gmelin's *Pelecanus palmerstoni*, but odd specimens from adjacent localities do not exactly agree with birds from other places.

Montrouzier's *Tachypetes chambeyroni* may be here temporarily associated. There is nothing in the description that would make me place *Fregata aquila** with *Fregata ariel*, as is done in the *Catalogue of the Birds in the British Museum*.

Schauinsland collected a fine series of birds at Laysan for the Hon. W. Rothschild, and these are easily distinguished by many points and will bear the name

FREGATA MINOR STRUMOSA (Hartert).

Rothschild's beautiful series from the Galapagos Archipelago prove that two very distinct forms live there, as pointed out by Ridgway but disputed by Rothschild and Hartert.

Ridgway's *Fregata aquila* is the bird breeding on the Southern Islands, while his *Fregata aquila minor* is the bird breeding on Culpepper and

* *Lapsus calami* for *Tachypetes chambeyroni*.

THE BIRDS OF AUSTRALIA.

Wenman Islands. These are exactly differentiated as Ridgway wrote, and as the names used by Ridgway are inapplicable I name the two forms

FREGATA MINOR MAGNIFICENS, subsp. n.

and

FREGATA MINOR RIDGWAYI, subsp. n.

The former breeds on Barrington, Indefatigable, Albemarle Islands, etc., and is characterised by its very large size. The largest female (procured as a straggler on Wenman Island) gives culmen 134 mm., wing 704 mm.

The latter breeds on Culpepper and Wenman Island (but Ridgway's bird was obtained as a straggler at Tower Island), and the female gives culmen 108 mm., wing 620 mm.

The differences between these two forms in coloration are that *F. m. magnificens*, in the male, has the breeding plumes on the back with a purple sheen, the feathers very narrow and the wing-coverts uniform black with a purplish sheen. In *F. m. ridgwayi* the breeding plumes on the back are broader and an oil-green colour prevails, while a brownish band extends along the wing-coverts.

The measurements of the two subspecies do not overlap in any way.

The larger Christmas Island, Indian Ocean, bird identified by Sharpe as *F. aquila* is a very distinct species, characterised by the male having the abdomen white and the female being all white underneath from the lower throat to the vent. It is also quite a large bird, the largest female giving the bill 136 mm. and the wing 635 mm.

It gives me great pleasure to call this species

FREGATA ANDREWSI, sp. n.,

as it was due to Dr. C. W. Andrews' gift that this investigation proved so interesting. *Fregata ariel* is differentiated, as is pointed out in the *Catalogue of the Birds in the British Museum*, by the male having a white patch on the flanks.

It has not such a wide range as *Fregata minor*, but may even be more local, for one of the results of my researches is the proof that *Fregata* is practically a sedentary genus.

The type locality of *Fregata ariel* is Raine Island, Torres Straits, and a series from Bedout Island, North-west Australia, shows that the latter bird is noticeably larger, the largest females giving culmen 90 mm. and wing 563 mm., while typical birds never exceed a wing length of 545 mm.

I therefore name the Bedout Island form

FREGATA ARIEL TUNNYI, subsp. n.

GREATER FRIGATE BIRD.

From the Mascarene group a subspecies can be recognised with a very small bill, the longest female bill being 80 mm., the longest wing 542 mm. I name this subspecies

FREGATA ARIEL IREDALEI, subsp. n.

selecting *Aldabra* as the type locality.

A form has also been noticed in the Atlantic Ocean, but no series are yet available.

In the preceding digest not much detail is given, but such details will all be found in my *Birds of Australia*, the part covering these birds being now in the press."

Though I emphasized in the last sentence that this was only a digest and not much detail was given, my friend, the Hon. W. Rothschild, has furnished a criticism in the *Novitates Zoologicae*, Vol. XXII., pp. 145-146, February 12, 1915, which I here reprint.

"Vol. XXII., February 12, 1915, pp. 145-146. On the genus *Fregata*.

"In the *Austral Avian Record*, Vol. II., No. 6, Mr. Mathews gives a synopsis of the genus *Fregata*.

"There are several points in this synopsis which need revision. As Mr. Mathews has stated in the *Catalogue of Birds*, only two species of the genus are recognised under the names of *F. aquila* and *F. ariel*. It is therefore of great importance to science that Mr. Mathews, by his careful study of the group, was enabled to show that there are a number of other species and several subspecies that have been overlooked. I regret much, however, that Mr. Mathews has fallen into a fundamental error in regard to the species which must bear the name *minor* Gmel. As he quite correctly states, the type of this name is the bird figured on plate 309 of Edwards' *Gleanings*; but he has failed to assign this plate correctly, for by only taking note of the fact that Edwards' bird was of unknown origin, he arbitrarily fixed the type locality as Jamaica. If he had studied the plate and read the description carefully he could not have failed to see that in Edwards' bird the throat and foreneck are white, while in all the West Indian birds it is blackish. There is considerable internal evidence in the text, besides the fact of the white throat, which proves the bird received by Edwards to have come from the eastern half of the Indian Ocean, so I must fix as the typical *Fregata minor* of Gmelin the birds of that area.

"A second error of Mr. Mathews is his placing the larger species found on the Galapagos Islands as a subspecies of *F. minor* under the name of *F. minor 'magnificens.'* This bird does not differ from the West Indian

THE BIRDS OF AUSTRALIA.

Frigate Bird except that my unique ♀ has the largest beak of any recorded Frigate Bird; my three males do not differ at all from birds killed by Dr. Ernst Hartert in the West Indies. This bird, which appears to occur on both sides of the American continent south of Florida, is quite a distinct species; the ♂ has entirely black wing-coverts and the ♀ a black throat and fore-neck.

“Mr. Mathews has made two subspecies of *F. ariel* Gould to occur in Australia; as he founds his *F. ariel tunnyi* on size alone, and it resolves itself into about 2 mm. difference in the bill and 15 mm. in the wing, this form is untenable.

“Below I give a key to the species and subspecies of *Fregata*, of which the following is a list:

- F. aquila* Linn., Ascension Island.
- F. andrewsi* Math., Christmas Island.
- F. magnificens* Math., Coasts and Islands of America.
- F. minor minor* Gmelin, Eastern Indian Ocean.
- F. minor aldabrensis* Math., Western Indian Ocean.
- F. minor palmerstoni* Gmelin, Laysan, Fanning and other West Pacific Island groups.
- F. minor ridgwayi* Math., Galapagos Islands.
- F. minor nicolli* Math., South Trinidad.
- F. ariel ariel* Gould, Australia.
- F. ariel iredalei* Math., Western Indian Ocean.

MALES.

1	{	Large white patch on sides of abdomen	9
		No white patch on sides of abdomen	2
2	{	Wings black	3
		Wings with brown band	4
3	{	Back metallic green	<i>F. aquila.</i>
		Back metallic purple	<i>F. magnificens.</i>
4	{	Abdomen and vent black	5
		Abdomen and vent white	<i>F. andrewsi.</i>
5	{	Breast black	7
		Breast brown	6
6	{	Wing-band very broad and pale, breast greyish-brown	<i>F. minor nicolli.</i>
		Wing-band narrower and darker brown, breast dark umber-brown	<i>F. minor palmerstoni.</i>
7	{	Wing-band pale greyish-brown	<i>F. minor ridgwayi.</i>
		Wing-band very dark brown	8
8	{	Smaller, wing 530-550 mm.	<i>F. minor minor.</i>
		Larger, wing 580-600 mm.	<i>F. minor aldabrensis.</i>
9	{	Bill larger, 80 mm.	<i>F. ariel ariel.</i>
		Bill smaller, 68-70 mm.	<i>F. ariel iredalei.</i>

GREATER FRIGATE BIRD.

FEMALES.

1	{ Entirely dark below	<i>F. aquila.</i>	
	{ Breast white		2
	{ With distinct white nuchal band		6
2	{ Breast white, abdomen dark		3
	{ Breast and abdomen white	<i>F. andrewsi.</i>	
3	{ Throat and fore-neck black	<i>F. magnificens.</i>	
	{ Throat and fore-neck greyish-white		4
4	{ Back black-brown	<i>F. minor ridgwayi.</i>	
	{ Back paler brown		5
	{ Back metallic	<i>F. minor aldabrensis.</i>	
5	{ Wing-band pale and broad	<i>F. minor nicolli.</i>	
	{ Wing-band darker and narrower	<i>F. minor palmerstoni.</i>	
	{ Wing-band very dark	<i>F. minor minor.</i>	
6	{ Bill larger, 95 mm.	<i>F. ariel ariel.</i>	
	{ Bill smaller, 80 mm.	<i>F. ariel iredalei.</i>	

“In addition to these I have examined a female with black throat and fore-neck and a huge bill from the Gambia, and a male from Cape Verd Islands, in the British Museum, the latter with black wings, but the back is steel black, NOT metallic green or purple. Further material will probably prove these to belong to a new subspecies of *magnificens*.

“There is also in the British Museum a ♂ Frigate Bird from the Hume collection, which is labelled as coming from the Malay Peninsula. The specimen is indistinguishable from the Ascension Island males. It is either a stray bird blown out of its course or the label has been erroneously transferred.

“Mr. Mathews’ contention that *Fregata minor ridgwayi* breeds only on Culpepper and Wenman Islands, while *magnificens* occurs only on the other islands, is disproved by Beck’s photographs (California Academy), which show both species breeding on Hood Island.”

This account is of interest for many reasons. Firstly, in view of my repeated assertions that a detailed account would appear in this place, it would have seemed reasonable that criticism should be withheld until after that was published. However, I have now the advantage of emphasizing points I had not made much of, or *vice versa*, through Mr. Rothschild’s interpellation. Consequently I thank him, as now my own results and his controversial points are brought together, and comparison can more easily be made than had such to have been separately examined.

With regard to the type locality of Gmelin’s *P. minor*, Mr. Rothschild claims that I have made a fundamental error. He does not state that he will enlarge upon his note given above, so that I conclude I have to deal only with what he has written. He states that “in Edwards’ bird the throat and fore-neck are white, while in all the West Indian birds it is blackish. There is considerable internal evidence in the text, besides the

THE BIRDS OF AUSTRALIA.

fact of the white throat, which proves the bird received by Edwards to have come from the eastern half of the Indian Ocean." When I fixed Jamaica, I would emphasize the fact that I had studied Edwards' plate and letterpress and I failed to see any evidence as to the origin of Edwards' bird. The only fact is that he received it from Mr. Isaac Romilly. I even searched through Edwards to see if I could find other gifts from the same donor which would lead to a suggestion of locality, but though there were such, none gave any clue whatever.

I have written most of the details given by Edwards and now add the rest, so that anyone can judge for themselves the evidence and see if they can find the considerable internal evidence which would justify any type locality save the one I fixed: "They are found only in warm countries, and are seen in seas at a distance from land. It appears to me to be the same with the *Rabihorcado* or *Raboforcado* of Willughby: see his account and figure, p. 395, Tab. LXXVII. Petiver has the same figure in his *Gazophylacium*, Tab. LIV. He calls it the Indian Forked-tail. The figures given by these authors (who, by the way, borrowed them from Nieremberg, see his *Hist. Nat.*, p. 221) are very imperfect, and can give no idea of the bird, and what they say of it amounts to no more than that it hath a forked tail. Du Tertre, *Hist. Nat. Ins. Antill.*, has given a description of this bird by the name of *La Fregate*, with an account of its long flight over the sea from land, and its combats with other sea-fowls for prey, etc. Ray, in his *Synopsis Avium*, p. 153-4, has given Du Tertre's description, etc., part of which is translated into Albin's *History of Birds*, Vol. III., p. 75." Edwards then concludes with the statement I have given previously, that a gentleman who had made several voyages to the East Indies had informed him that the males were black.

This last sentence is the only mention of the East Indies, and it certainly refers in no way to the bird Edwards figured. Edwards admits his bird is the same as that of Du Tertre, and therefore I arbitrarily selected Jamaica.

Now, as to the value of the white throat which Mr. Rothschild lays stress upon. My own conclusion is that it is not a constant feature but simply a seasonal one; that is, though some races may have a lighter throat than others, the races of which the adult females have black throats show in immature males and females a whitish throat. The series available are not long enough to show all the plumage changes, but this fact is clearly seen in connection with Aldabra birds. The set in the Rothschild Museum from Seychelles are quite instructive in this respect, as the adult female from Aldabra has a black throat while all the other immature males and females show a light throat. I have stated that

GREATER FRIGATE BIRD.

Edwards' figure represented an adult female, but it could be just as well an immature male, and from the Aldabra series would just as certainly occur in the West Indies as in the East Indies. The only conclusion I can foresee is that Mr. Rothschild has produced no evidence to prove a fundamental error in my selection of Jamaica, but rather that he himself has erred in too quickly assuming my inaccuracy.

My second error I will quickly plead guilty to. I will at once recognise *magnificens* as a distinct species, *but it is confined to the Galapagos Group as far as is yet known*. Here, again, my critic has been rather superficial, for he has only casually examined his own series and not thoroughly reviewed it. Had he done so he might have withheld most of his criticism, for he states that the Galapagos *magnificens* does not differ from the West Indian birds. He specially mentions that his three males do not differ at all from birds killed by Dr. Ernst Hartert in the West Indies.

The measurements I took of these birds read :

Galapagos ♂ Culmen 106-113, wing 646-660, tail 470-510, middle toe 51-53 mm.

The very largest bird from the West Indies measures :

♂ Culmen 104 wing 647 tail 430 middle toe 50 mm.

A male procured by Dr. Ernst Hartert at Aruba (the only one I have note of) measured :

♂ Culmen 110 wing 592 tail 410 middle toe 53 mm.

There is a distinct discrepancy in these measurements which might be (most incorrectly) minimised, but the very long tail of *magnificens* is characteristic, and in addition the coloration of the back plumes is different. When Ridgway pointed this out, Messrs. Rothschild and Hartert said they could not recognise it, and now Mr. Rothschild is doing the same thing. The West Indian birds have a bronze-purple gloss and not a purple-blue like *magnificens*.

It will be observed that Mr. Rothschild has given his reasons for assigning *magnificens* specific rank, as "the ♂ has entirely black wing-coverts and the ♀ a black throat and fore-neck." He then makes "*aldabrensis*" a subspecies of *minor*, the males having a "wing-band very dark brown." It is so dark as to be scarcely appreciated in an adult male preserved in the Rothschild Museum. Of the female "*aldabrensis*" he writes: "throat and fore-neck greyish-white," though he has a specimen showing a black throat, which would therefore come under *magnificens*. When more material becomes available and again a study is made, I foresee my conclusions being confirmed and *F. magnificens* restricted to the Galapagos Islands.

Mr. Rothschild's notes are very interesting, as they afford confirmation of the majority of my conclusions, a result I had not anticipated so quickly. Where Mr. Rothschild differs I consider he has not convinced me,

THE BIRDS OF AUSTRALIA.

save in the case of *F. magnificens* being a distinct species, but then I do not agree with him as to its distribution.

Mr. Rothschild has used *palmerstoni* for the Pacific forms, including the Laysan series under that name. This may be done, but the more accurate method would be to use for the Laysan birds the name certainly applicable to them, especially in view of the facts now known and admitted.

Mr. Rothschild notes that "Beck's photographs (California Academy) show both species breeding on Hood Island (Galapagos)." I have not seen these photographs, which I presume have been published, though Mr. Rothschild does not say so, and, if so, the letterpress should be of interest, as until my investigation no writer, save Ridgway, appears to have recognised two forms from the Archipelago, and according to my notes no birds at all are available from Hood Island.

The preceding will show that Mr. Rothschild's criticisms are valuable, inasmuch as they show how another worker views a question, but they cannot be accepted without further material. I am therefore retaining *F. minor listeri* in this place, and still continuing my usage of *F. minor minor* for the West Indian bird. I would, however, reject the identity of the West Indian and Galapagos birds, if the type locality of Gmelin's *P. minor* be changed to the East Indies, and would therefore propose that the West Indian form I have described previously be called

FREGATA MINOR ROTHSCILDI, subsp. n.

and cite Aruba as the type locality.

This form differs from *F. magnificens* in its smaller size, conspicuously shorter tail, and different coloration of the breeding-plumes and also of the wing-coverts.

I find I did not make a note about the Gambia bird and the Cape Verde bird Mr. Rothschild mentions, though I examined them and concluded that the Cape Verde specimen was the representative of a race which breeds on that group, while the Gambia one could not be classed in view of the West Indian variation.

The forms then to be recognised would read:

F. aquila (Linné), Ascension Island.

F. magnificens Mathews, Galapagos Islands.

F. andrewsi Mathews, Christmas Island, Indian Ocean.

F. minor minor (Gmelin), West Indies.

F. minor nicolli Mathews, South Atlantic Ocean.

F. minor aldabrensis Mathews, Western Indian Ocean.

F. minor listeri Mathews, Eastern Indian Ocean and North Australia.

F. minor palmerstoni (Gmelin), South Pacific Ocean.

F. minor ridgwayi Mathews, Galapagos Islands.

GREATER FRIGATE BIRD.

It will be seen I retain *listeri*, but if Mr. Rothschild's view be accepted (I can see no reason for doing so) then this would become *minor*, and *rothschildi* would replace *minor*. *F. minor palmerstoni* is here used to cover *strumosa* Hartert, but that is only a tentative usage.

It is very gratifying to find that Mr. Rothschild's review has left practically unaltered my own conclusions.

I would, however, point out that I do not lay as much stress upon the wing coloration as Mr. Rothschild appears to do, especially as the bar is seen to vanish in the West Indian Ocean birds, and I believe it decreases as the bird grows older, being more prominent in the immature.

I will deal with his remarks *re F. ariel* under the next species.

FREGATA ARIEL ARIEL.

EASTERN LESSER FRIGATE BIRD.

Atagen ariel Gray, Genera Birds, Vol. III., p. 669, pl. 183, 1845 (Jan.) : Raine Island, North Australia.

Atagen ariel Gray, Genera Birds, Vol. III., p. 669, pl. 183 (sometimes 185), 1845 ; Gould, Birds Austr., Vol. VII., pl. 72, 1848 ; Macgillivray, Narr. Voy. " Rattlesnake," Vol. II., App., p. 359, 1852.

Fregata ariel Reichenbach, Synops. Natat., pl. 57, fig. 375 ; pl. 64, figs. 2545-6, 1850 ; Ogilvie-Grant, Cat. Birds Brit. Mus., Vol. XXVI., p. 447, 1898 (part) ; Hall, Key Birds Austr., p. 103, 1899 ; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 991, 1901 ; Hall, Key Birds Austr., 2nd ed., p. 103, 1906 ; Mathews, Handl. Birds Austral., p. 38, 1908 ; Campbell and White, Emu, Vol. X., p. 204, 1910 ; Macgillivray, *ib.*, pp. 222, 226, pls. xxvi., xxviii., 1910 ; Mathews, Nov. Zool., Vol. XVIII., p. 242, 1912 ; North, Austr. Mus. Spec. Cat., no. 1, Vol. III., p. 353, 1912.

Tachypetes minor (not Gmelin) Bonaparte, Cons. Gen. Av., Vol. II., p. 167, 1856 ; Gould, Handb. Birds Austr., Vol. II., p. 499, 1865 ; Masters, Proc. Linn. Soc. N.S.W., Vol. I., p. 64, 1876 ; North, Austr. Mus. Cat., no. 12, p. 364, 1890.

Fregata minor Schlegel, Mus. Pays-Bas, Vol. VI., Pelec., p. 3, 1863 ; Selater and Salvin, Proc. Zool. Soc. (Lond.) 1878, p. 650 ; Salvadori, Orn. Papua. e Moll., Vol. III., p. 404, 1882.

Atagen minor Gray, Handl. Gen. Sp. Birds, pt. III., p. 131, 1871 ; Ramsay, Proc. Linn. Soc. N.S.W., Vol. II., p. 203, 1878 ; *id.*, Tab. List Austr. Birds, p. 25, 1888.

Fregata ariel ariel Mathews, List Birds Austr., p. 100, 1913.

Tachypetes ariel Macgillivray, Emu, Vol. XIII., p. 148, 1914.

DISTRIBUTION. North-eastern Australia.

Adult male. General coloration black, the under-parts with a brownish tinge ; the head with long narrow feathers showing a deep blue sheen, as do also the lanceolate breeding plumes on the back ; wing-coverts uniformly black ; a white patch on each side of the body ; legs and feet black ; bill grey ; skin of throat red ; eyes and eyelids black. Culmen 80 mm., wing 535, tail 270, middle toe 45 (Raine Island).

Adult female. Coloration as in next subspecies. Feet red ; eyes red ; the skin of the throat is of a lighter red in the male than in the female. Culmen 88 mm., wing 545 (Raine Island).

Immature. Undescribed.

EASTERN LESSER FRIGATE BIRD.

Immature with down adhering on under-parts. Head, neck and throat deep rusty-red; back brown with lighter tips; scapulars long, brownish-black; primaries and primary-coverts, bend of wing inside and out black; secondary-coverts brown with pale whitish tips; breast downy, showing black feathers in the form of a band across the lower breast; abdomen white; under tail-coverts black; tail black, long and slightly forked; bill and feet of a white colour with a shade of blue; eyes black (Raine Island).

Young in down. Pure white; scapulars and mantle feathers dark brown with lighter tips; secondaries just sprouting (Raine Island).

Nest. "Placed on the ground and composed of a few sticks collected from shrubs and herbaceous plants" (Ince).

Eggs. "Clutch one, sometimes two, pure white and not so chalky in appearance as those of the Gannet, and nearly the same shape at both ends" (Ince).

Breeding-season. May, June and July.

THE life-history of this bird is comparatively unknown. Gould wrote: "Commander Ince on Raine Island found this bird breeding in colonies at its S.W. corner, the nest being composed of a few small sticks collected from the shrubs and herbaceous plants which alone clothe the island, and placed either on the ground or on the plants a few inches above it. The eggs, which are generally one, but occasionally two in number, are of a pure white, not so chalky in appearance as those of the Gannet, and nearly of the same shape at both ends. Upon one occasion I killed the old birds from a nest that contained a young one; on visiting the spot I found the young bird removed to another nest, the proprietors of which were feeding it as if it had been their own. I am sure of this fact, because there was no other nest near it containing two young birds. Some of the eggs were quite fresh, while others had been so far sat upon that we could not blow them, and many of the young birds must have been hatched some two or three weeks. We regarded these birds as the Falcons of the sea, for we repeatedly saw them compel the Terns, Boobies and Gannets to disgorge their prey, and then adroitly catch it before it fell to the ground or water. We never saw them settle on the water, but constantly soaring round and round, apparently on the watch for what the smaller birds were bringing home. I have found in their pouch young turtles, cuttle-fish, and small crabs."

The mounted birds in the Sydney Museum Mounted Gallery marked *aquila* are this species.

The only observations made by Australian ornithologists appear to be those following, where, owing to some misunderstanding, little note was made and a valuable opportunity missed of making an historic contribution to our knowledge; this still remains to be done.

"On the eastern side of the island, near its centre, we come upon the nesting-place of the Frigate-Bird (*Fregata ariel*), where about fifty young

THE BIRDS OF AUSTRALIA.

birds, fully feathered and able, but unwilling to fly, are congregated. They are all at about the same stage of development, and give the idea that the eggs must have been laid about May or June. Two young birds seem to be about each nest, and the nests consist of flat platforms of sticks and grass, raised from 4 to 6 inches above the general level of the ground where they are not placed on some small ledge of rock or other elevation. They are, of course, at this stage trodden down and liberally covered with excreta, but give one the idea that they were formerly about 8 inches in diameter. The young birds in general colour are remarkably like the lighter coloured examples of our Wedge-tailed Eagle (*Uroaëtus*).” (Macgillivray, *Emu*, Vol. X., p. 226, 1910; Raine Island.) (The plate accompanying this note shows adult males only.)

p. 228. “We witness an encounter between a Lesser Crested Tern and a Frigate-Bird. The Tern, uttering shrill cries of alarm, endeavours, by turning and dodging, to elude the buffetings of its pursuer, but at last opens its bill and disgorges two fish, which, by an easy and seemingly effortless double swoop, are in turn caught and instantly swallowed by the Frigate-Bird. We have several times before noticed them pursuing and bullying Terns of different species, usually the larger ones—*H. caspia*, *S. media*, and *S. bergii*. Frigate-Birds are usually to be seen about all the islands, soaring overhead like great long-winged Hawks, until darkness closes in, waiting to rob any Terns flying to roost with a cropful of fish.”

An additional note in the *Emu*, Vol. XIII., p. 148, 1914, by the same writer records: “Mr. M'Lennan noted six of these birds at Cape Grenville. They headed out to sea when they reached the Cape. At Raine Island on the 9th July, 1911, he notes: ‘Several colonies of Frigate-Birds were seen near the beacon. Went and had a look at the Frigate-Bird colonies. They were eight in number, of from three to thirty nests. I counted 150 nests altogether, several of which contained one egg each: two of these were on the point of hatching. The rest of the nests contained one young bird each, in all stages of plumage, from a couple of days old to birds ready to fly. On the 27th July two birds only were noted at Bramble Cay.’”

If only these plumages had been carefully noted a good piece of work would have been performed. In the photo given by Macgillivray of “young birds, fully feathered, and able but unwilling to fly,” only adult males appear. The young are pale red-headed birds, and M'Lennan would see this at the second visit, but no record has been given.

As previously indicated, Gray's* *Fregata ariel* is a very distinct species. I have also noted that I had observed subspecies.

* It seems to have been overlooked by everyone up to the present that Gray published a beautiful figure of this bird three years before Gould, and, consequently, must be cited as the author of the name.

EASTERN LESSER FRIGATE BIRD.

The type locality is Raine Island, North-east Australia, and a remarkable fact is the extreme prevalence of black males in collections.

The type locality is represented in the British Museum by downy young, immature and adults. The adult males have a maximum wing-length of 535 mm., while females reach 545 mm.

In the Rothschild Museum a series is preserved from Bedout Island, which show the following measurements :

♂	Culmen	88	wing	523+	tail	305+	middle toe	43 mm.
♂	„	94	„	553	„	365	„	46
♀	„	89	„	562	„	350	„	43
♀	„	90	„	563	„	350	„	45
♀	„	88	„	543+	„	340	„	45

These figures are confirmed by a specimen in my collection: ♀ Culmen 92, wing 565.

Another bird from North-west Coast Australia in the British Museum gives: ♂ Culmen 88, wing 545, tail 325, middle toe 48.

Birds preserved in the Perth Museum, West Australia, have wing-lengths as follows:

Point Cloates ♂ 533 and 536 mm. Bedout Island ♂ 525+ and ♀ 558 mm. These were measured some years ago, so that at the present time my method of measurement would show larger measurements.

Consequently, it is obvious that these birds show a larger measurement than Raine Island birds. Unwilling to indicate a different subspecies from the two sides of Australia, though my experience with the larger birds had proved their sedentary habits, I carefully criticised all the birds from localities east of Torres Straits. No long series are available, so that it is more than probable more subspecies are here confused: the one fact certainly found was that the largest female measured 537 mm. in the wing and the largest male only 526 mm.

It was therefore necessary to distinguish this larger Western form.

As previously indicated, Rothschild and Hartert wrote that this species did not go much above the Equator, but it was noted in the Caroline Islands by Lesson where it probably breeds. It may be breeding in the Marshall Group, *cf.* Finsch (*Ibis* 1880, pp. 329-30). Examples are in the British Museum from Amoy and Hakodadi, unfortunately immature, but it is now certain these came from some locality not far distant; an immature specimen comes from Luzon, Philippines, and though it has not yet been found breeding there, no doubt can be held that it does so, judging from recorded observations. From the Mascarene Islands I have examined seven birds, which must bear a different subspecific name, as though the wing-measurement is similar to

THE BIRDS OF AUSTRALIA.

that of the typical subspecies, the bill is noticeably smaller. The wings measure: ♂, 512, 518, 525; ♀ 525, 542 mm.; while the bills give ♂ 75, 77, 78, 78, 80; ♀ 80, 82 mm. These measurements differ appreciably from those of the Bedout Island birds, while from East of Torres Straits the shortest billed birds gave ♂ 82, ♀ 83 mm., and these were from the furthest eastern locality and perhaps were representatives of another subspecies distinct from *F. ariel ariel*.

There is probably another easily-separated subspecies resident in the Atlantic Ocean, but only two immature specimens are yet available. Nicoll wrote: "I saw several examples of this species at South Trinidad, but obtained only one, an adult male, which was shot by Mr. Lindsay from the yacht as she lay off the island." The specimen in the British Museum is in immature plumage, and as it was obtained in January it is probable that the species breeds there. It cannot be the one Nicoll records (*Ibis* 1906, p. 673), as he wrote: "Bill black, pouch bright brick-red; tarsi and toes black." The immature has the data: "Bill black with greenish tip; round eye black; sac red; feet black above, yellowish flesh-colour below, a patch of same colour on upper side of each web" (M. Nicoll).

Although the juvenile plumages in this species and *F. minor* are very similar, the method of change seems different. Thus the immature of the present species has a rust-coloured head as in the other species, but in this the rust colour appears to be evenly retained while the black breast-band vanishes. In *F. minor* the rust colour on the head vanishes first, a rusty coloured spot remaining on the breast and disappearing with the black breast-band, both disappearing simultaneously, the red perhaps lasting longest. A phase in *F. minor* in which the bird breeds has the head, neck and all the under-parts white. *F. ariel* shows no such phase as far as can be judged, nothing at all like it being seen, and from observations on the immature available the bird seems to moult from the rusty-red coloured juvenile dress direct into the fully adult plumage. This brings up the question of sea-birds such as the present, Gannets and Albatrosses being subspecifically distinguished by their moulting phases.

From some localities *Fregata minor* is represented by black adult males commonly: from others practically none such are available. Observers such as Dr. Percy Lowe state that black males are very scarce and immature birds commonly breed. At the present time, since no attention has been given to such problems, it is impossible to put forward any reliable data from Museum specimens, as it is probable that the majority are selected specimens. As an example, take the Rothschild Collection of Galapagos *Fregata minor*. Adult black males are common from the Northern Islands, and reference to

EASTERN LESSER FRIGATE BIRD.

the diary printed in connection I note thirty-six birds were collected at that time. The questions: Were the majority black males? or Were these specimens the only black males? are unanswerable at present. When these birds are studied in connection with their habitats, a great deal of interest will be taken in them and probably many unexpected results will be achieved. Dr. C. W. Andrews tells me, from memory—and he has no notes of any occurrence—that the white-headed phase of *Fregata minor* nor of *F. andrewsi* certainly did not breed on Christmas Island.

Walker writes of birds of *F. ariel* breeding on Adèle Island in immature plumage, but gives no details. I have seen nothing in immature plumage save the rusty-coloured head stage, and none of these have been otherwise reported as breeding and it does not look like a breeding-plumage; the white-headed phase of *F. minor* gives that suggestion, and Dr. Lowe considered them as looking like old females. I then would accept the separation of *F. ariel* into subspecies thus:

FREGATA ARIEL ARIEL (Gray).

Raine Island (breeding);

East Australia.

FREGATA ARIEL TUNNYI Mathews.

Bedout Island (breeding);

West Australia.

FREGATA ARIEL IREDALEI Mathews.

Mascarene Islands.

Differentiated by means of its small bill and small size from *F. a. tunnyi*, its nearest geographical relation, by its much smaller bill and wing, as detailed above.

FREGATA ARIEL, subsp. indet.

Atlantic Ocean.

In the North-west Pacific other races may occur, as birds have been procured at Amoy, Japan, Philippine Islands; the Caroline Islands may be a breeding locality, and possibly also the Marshall Group.

I have not altered anything save to make corrections. Mr. Rothschild, in the essay quoted under the preceding species, has suppressed *F. a. tunnyi* as the difference in size seemed too slight. The details given above will show my own hesitation, and only the fact of its constancy made me differentiate the West Australian bird. It will be obvious that until more material *proves* my conclusions incorrect, the only accurate course is the recognition of *F. a. tunnyi*, and this course I pursue. I do not think, now, that accession of specimen will do otherwise than confirm the distinction I have indicated.

FREGATA ARIEL TUNNYI.

WESTERN LESSER FRIGATE BIRD.

(PLATE 230.)*

FREGATA ARIEL TUNNYI Mathews, Austral Av. Rec., Vol. II., p. 121, 1914; Bedout Island, Mid-west Australia.

Fregata ariel Tunny, Emu, Vol. I., p. 73, pl. ii., 1902; Hartert, Nov. Zool., Vol. XII., p. 207, 1905; Crossman, Emu, Vol. IX., p. 149, 1910.

Tachypetes minor Walker, Ibis 1892, p. 259; Carter, Emu, Vol. III., p. 211, 1904.

Fregata ariel tunnyi Mathews, Austral Av. Rec., Vol. II., p. 121, 1914.

DISTRIBUTION. Mid- and North-western Australia.

Adult male. As in the preceding race but larger. Iris dark brown; leg black; bill blue from skin. Culmen 88-94 mm., wing 532-553, tail 365, middle toe 46.

Adult female. Differs from the adult male in having the breast and sides of breast buffy-white; a chestnut collar on the lower hind-neck; lesser and median upper wing-coverts brown with whitish edges and blackish shaft-streaks, the long scapulars brown at the ends. Bill bluish horn; iris brown; eye-rim and gular-sac red; feet fleshy-red. Total length 800 mm.; culmen 92, wing 565, tail 335, tarsus 23.

Immature. Undescribed.

Nestling. Pure white down throughout save round eyes and fore-head, where it is rusty-red; gullet naked; patch of brown feathers on back. Iris black; legs white. "Born naked like young Gannets" (Walker).

"Older birds are covered with white down, with a saddle-shaped band of dark grey feathers across the back and scapular region" (Walker).

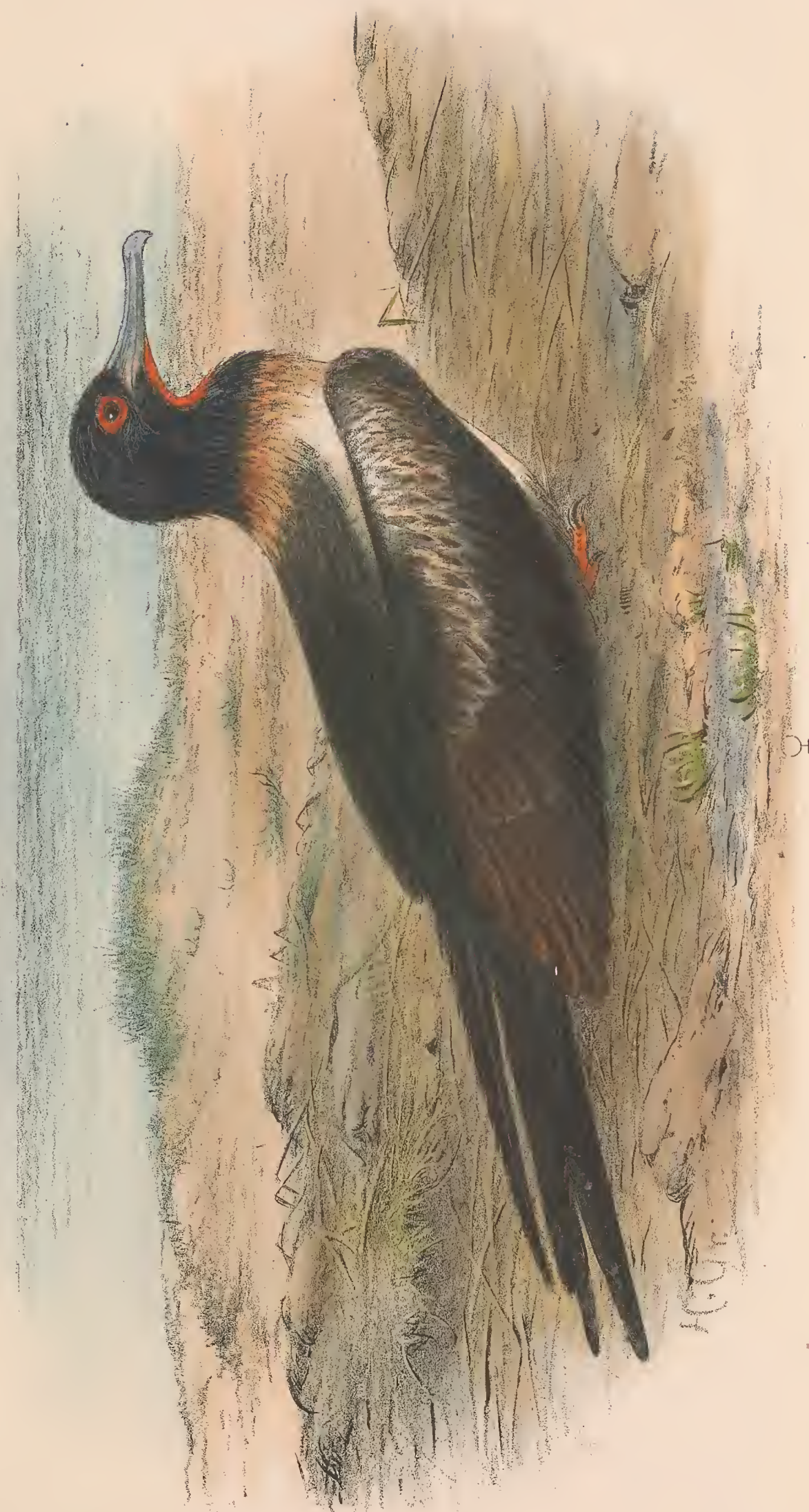
Nest. "Of stalks of grass and *Ipomœa*, small twigs, etc. The average dimensions of each nest were about one foot in height by a little more in diameter" (Walker).

Eggs. "A single egg, averaging $2\frac{1}{2} \times 1\frac{1}{2}$ inches, pure white in colour, very thin-shelled, with only a very slight limy coating" (Walker). "One egg to each nest" (Tunny). "Measurements 59.7-70.6 $\times$ 41-47.7 mm." (Hartert).

Breeding-season. April (Tunny); May (Walker).

THE only field-notes in regard to this form are from Mr. James Walker, who contributed to the *Ibis* 1892, p. 259, an account of the birds breeding on Adèle Island, North-west Island: "These fine birds had been noticed while we were wading over the flats, soaring high above all the sea-fowl, many of them,

* The Plate is lettered *Fregata ariel*.



H. Grönvold, del.

Witherby & Co

$\frac{1}{4}$
FREGATA ARIEL.
(LESSER FRIGATE BIRD).

WESTERN LESSER FRIGATE BIRD.

indeed, reduced to mere black specks against the blue sky. Extending for more than half-a-mile along the middle of the island was a narrow strip of open land, almost free from the usual high grass, and covered chiefly with the *Ipomœa*. Here the nests of the Frigate Birds were to be seen in clusters or bunches of from five to six to as many as twenty together (very rarely singly), and built directly on the ground of stalks of grass and *Ipomœa*, small twigs, etc. The average dimensions of each nest were about one foot in height by a little more in diameter, though frequently the clusters of old nests, which were evidently used for a succession of years, formed masses of very considerable size. As in the case of the Gannets and Cormorants, the hollow in the nests was very slightly defined, and in each was deposited a single egg, averaging $2\frac{1}{10} \times 1\frac{5}{8}$ inches, pure white in colour, very thin-shelled with only a very slight limy coating. A few of the eggs were newly laid, and easily recognizable by their delicate and beautiful pink tinge, but the great majority were very 'hard-set,' and there were a great many young birds in the nests. These, when just out of the shell, were quite naked, like the young Gannets, which they then greatly resembled; when more advanced they were covered with a scanty white down, and had a conspicuous saddle-shaped band of dark grey feathers across the back and scapular region. Nearly all the brooding birds were females, some of them in quite immature dress, but among them were many fine old cocks, conspicuous by their deep green-glossed black plumage and scarlet throat-pouches. A few stray Gannets, usually of the white species [*cyanops*?] had taken up their quarters for incubation among the Frigate Birds, but were evidently regarded with but little favour by the legitimate occupants of the ground. The tameness, or rather indifference, of these birds, especially of the females, was most surprising. As one walked among the nests, the sitting birds nearest at hand merely stretched out their necks, snapped their long, slender, hooked bills, and uttered a croak like that of the White Gannet, but very much more feeble; while to obtain the egg it was necessary to push the bird off the nest, when it took wing without apparent difficulty. The birds on the adjoining nests, little more than arm's length distant, meanwhile took absolutely no notice of the intruder. The young birds, when of any size, were much more vicious than their parents, and energetically resisted any attempt to take them off, croaking and snapping fiercely with their bills."

Mr. Tom Carter has given me the following interesting note: "Aboriginal name, Wànnoo. Although this fine species is abundant in the far North-west, the birds do not seem to usually go south of the North-west Cape. Whenever seen at Point Cloates, it was a sure sign that a hurricane was either then raging in the north or was approaching further south. The natives in my

THE BIRDS OF AUSTRALIA.

employment always classed them, with other occasional visitant birds, as 'Rain brothers.' In the evening of January 25, 1898, a flock of Frigate Birds was hovering above my house and kitchen at Point Cloates, and I shot two of them for identification. Two hours afterwards a hurricane was raging, and lasted all the night and following day. Some of these birds were observed on other occasions when hurricanes were in the vicinity. They appear to be nocturnal in their habits to a certain extent, because on one occasion when travelling near the North-west Cape, in very threatening weather, my native and self noticed small flocks of these birds in the course of the day, and at night, when camped close to the beach with the moon just after the full, our attention was attracted by its light being at times temporarily obscured, although the sky was cloudless. Looking upwards we clearly saw several Frigate Birds flying northwards, their shape being unmistakable."

The bird figured and described is a female, the type of *F. tunnyi* collected on Bedout Island, Mid-west Australia, on the 19th of March, 1901.

GENUS—SCÆOPHÆTHON.

SCÆOPHÆTHON Mathews, Austral Avian Record,

Vol. II., p. 56, 1913 Type *S. westralis*.

Phœnicurus Bonaparte, Comptes Rendus Sci. (Paris),

Vol. XLI., p. 1115, 1856 Type *S. rubricauda*.

(Not *Phœnicurus* Forster 1817.)

LARGE Phæthontid birds, with short deep, laterally compressed, not hooked, bills, long wings, short tails with extraordinary elongated central pair of tail-feathers, short legs and feet, the four toes connected with a web.

The bill is longer than the head, not hooked, but the culmen arched, deep, much laterally compressed, the edges of both mandibles coarsely serrated. The nostrils are open linear slits placed high up near the base of the culmen, the feathering running back from the nostrils to the gape at a very acute angle; the gape is wide; the rami of the lower mandible are thick, placed close together, enclosing a very narrow feathered tract, and fusing at two-thirds the length of the mandible; the culmen chord is twice the length of the metatarsus. The wing is long with the first primary longest.

The tail is short, slightly wedge-shaped, composed of sixteen feathers, the central pair very much elongated, the webs very much diminished: this pair are about six times the length of the culmen, while the second pair are less than twice its length.

The legs are short and thick, the toes short and rough. The metatarsus is less than half the length of the culmen and is covered with hexagonal roughened scutes, the scutes much smaller at the back. The toes are all connected with webs, but are nothing like the feet of any other Steganopod. That is, the middle toe is longest, the outer toe longer than the inner, while the hind toe is very small and placed posteriorly. The scaling of the toes consists of regular scutes.

In the *Catalogue of the Birds in the British Museum*, Vol. XXVI., 1898, p. 450, the family *Phæthontidæ* is recognised, covering one genus *Phæthon*. Six species are admitted, no subspecies being indicated. The family had

THE BIRDS OF AUSTRALIA.

been previously divided into genera, and no reasons were given for the rejection of these.

Reichenbach, in the *Nat. Syst. Vögel.*, p. vii., 1852, wrote :

<i>Tropicophilus</i> Leach	<i>æthereus</i> L. Gm.
<i>Lepturus</i> Moehr	<i>edwardsi</i> and <i>flavirostris</i> Brandt.
<i>Phæthon</i> L.	<i>phænicurus</i> L. Gm.

Bonaparte, in the *Comptes Rendus Sci.* (Paris), Vol. XLI., p. 1115, 1856, and in the *Consp. Gen. Av.*, Vol. II., p. 183, 1857, continued this usage of three genera, but corrected the error made by Reichenbach with regard to the type of *Phæthon* L., correctly designating *æthereus* Linné as the type, and proposing *Phænicurus* for the species *phænicurus* L. Gm.

Examination of the species convinced me of the propriety of admitting these three generic groups, but criticism of the names showed that none save *Phæthon* Linné was valid.

In the *Austral Avian Record*, Vol. II., 1913, p. 56, I therefore proposed :

“SCÆOPHÆTHON, gen. nov. Differs from *Phæthon* Linné in its longer wing, stronger legs and feet, shorter tail, though as powerful in the bill.

“Type, *Phæthon rubricauda westralis* Mathews.

“LEPTOPHÆTHON, gen. nov.* Differs from *Phæthon* Linné in its much smaller size throughout, though having a comparatively longer tail.

“Type, *Phæthon lepturus dorotheae* Mathews.”

“NOTE.—The Tropic Birds have been referred to the one genus *Phæthon*, though here again generic rank is due to the differences observed. *Phæthon* and *Scæophæthon* agree somewhat in size, but the latter has discarded the plumage of the former, which is seen in the juvenile, in favour of a uniform white one ; it has also developed in size. *Leptophæthon*, on the other hand, has also achieved the beautiful adult-plumage of *Scæophæthon*, but is sadly diminished in size. However the evolution has proceeded, the birds are now sufficiently distinct to warrant generic separation.”

The synonymy of *Scæophæthon* and *Leptophæthon* is given under these generic names, but as *Phæthon* Linné does not occur in Australian waters, it might be as well to note that *Lepturus* Brisson and *Tropicophilus* Stephens and of Reichenbach are synonyms of the restricted genus *Phæthon*.

Systematically the genus *Phæthon* has always been a stumbling block, the toti-palmate feet being the great obstacle. On account of this character the genus and family are placed among the *Steganopodes*, with the other members of which Order it has very little affinity. As already noted under *Fregata*, most of the workers investigating the anatomy of that genus and also this seem to have been throughout prejudiced by the toti-palmation of

SCÆOPHÆTHON.

the feet. Beddard concluded: "There is no doubt that *Phæton* is very different from the other genera of the group; indeed, if it were not for *Fregata* it would be difficult to avoid removing it altogether" (*Struct. Classif. Birds*, p. 417, 1898). Throughout Beddard shows his conclusions regarding the inter-relationship of the birds to be imperfect, and *Phæthon* seems to be the form which does not easily undergo reconciliation. If it has to be included in the *Steganopodes* through its affinity with *Fregata*, then its claim must be very slight indeed. Superficially these two genera differ in every detail, even to the feet, and internally as much difference is recorded. Criticising the conclusions of Beddard and Pycraft, the difficulty is to find out the points of similarity: any such I have noticed is common to forms not admitted as *Steganopod*.

The bill of *Phæthon* is as unlike that of *Fregata* as a bill could be: in downy nestlings the dissimilarity is as pronounced. Were these two genera at all closely phylogenetically related the juveniles would show an approach in general characters. This is not seen. I suggest that *Phæthon* is more certainly an aberrant Lariform bird, and that the toti-palmation of the foot is not evidence of relationship with the *Steganopod* genera *Phalacrocorax* and *Sula*, and that *Fregata* and *Phæthon* be taken out of the *Steganopodes*.

Key to the Subspecies.

- | | | |
|-----------|--|-----------------------------|
| <i>A.</i> | Larger : general coloration ruddy .. | <i>S. r. novæhollandiæ.</i> |
| <i>B.</i> | Smaller : general coloration silky-white
suffused with pink | <i>S. r. westralis.</i> |

SCÆOPHÆTHON RUBRICAUDA NOVÆHOLLANDIÆ.

RUDDY TROPIC BIRD.

PHÆTHON NOVÆHOLLANDIÆ Brandt, Mém. l'Acad. Imp. Sci. St. Petersb., Ser. VI., Vol. V., pt. II., p. 272, 1840 ; Lord Howe Island.

New Holland Tropic Bird Latham, Gen. Hist. Birds, Vol. X., p. 448, 1824.

Phæthon novæhollandiæ Brandt, Mém. l'Acad. Imp. Sci. St. Petersb., Ser. VI., Vol. V., pt. II., p. 272, 1840.

Phæton phœnicurus Gould, Birds Austr., Vol. VII., pl. 73, 1848 ; Reichenbach, Synops. Natat., pl. 56, figs. 350, 351 ; pl. 64, figs. 2551-2, 1850 ; Macgillivray, Narr. Voy. "Rattlesnake," Vol. II., App., p. 359, 1852 ; Pelzeln, Sitzber. z. b. K.K. Akad. Wien., Vol. XLI., p. 331, 1860 ; Gould, Handb. Birds Austr., Vol. II., p. 501, 1865 ; Etheridge, Austr. Mus. Mem., no. 2, pp. 16, 17, 1889.

Phœnicurus rubricauda Bonaparte, Consp. Gen. Av., Vol. II., p. 183, 1856 (part).

Phæton rubricauda Gray, Ibis 1862, p. 250 ; Schlegel, Mus. Pays-Bas, Vol. VI., Pelec., p. 44, 1863 (part) ; Gray, Handl. Gen. Sp. Birds, pt. III., p. 125, 1871 ; Tristram, Ibis 1876, p. 266 ; Ramsay, Proc. Linn. Soc. N.S.W., Vol. II., p. 203, 1878 ; Buller, Trans. New Zeal. Inst., 1877, Vol. X., p. 219, 1878 ; Layard, Ibis 1878, p. 265 ; *id.*, *ib.*, 1880, p. 233 ; *id.*, *ib.*, 1882, pp. 542, 544 ; Buller, Man. Birds New Zeal., p. 97, 1882 ; Crowfoot, Ibis 1885, p. 268 ; Buller, Birds New Zeal., 2nd ed., Vol. II., p. 186, 1888 ; Ramsay, Tab. List Austr. Birds, p. 38, 1888 ; North, Austr. Mus. Mem., no. 2, p. 47, 1889 ; *id.*, Austr. Mus. Cat., no. 12, pp. 362, 378, pl. xix., fig. 1, 1890 ; Cheeseman, Trans. New Zeal. Inst., Vol. XXIII., 1890, p. 223, 1891 ; Sharpe, Hist. Coll. Nat. Hist. Brit. Mus., Vol. II., p. 154, 1906.

Phæthon rubricauda Ogilvie-Grant, Cat. Birds Brit. Mus., Vol. XXVI., p. 451, 1898 (part) ; Hall, Key Birds Austr., p. 103, 1899 ; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 994, 1901 ; Hall, Key Birds Austr., 2nd ed., p. 103, 1906 ; Buller, Suppl. Birds New Zeal., Vol. II., p. 53, 1906 ; Mathews, Handl. Birds Austral., p. 38, 1908 ; North, Austr. Mus. Spec. Cat., no. 1, Vol. III., p. 356, 1912 ; Macgillivray, Emu, Vol. XIII., p. 148, 1914.

Phæthon rubricauda erubescens Rothschild, Avif. Laysan, pt. III., p. 296, 1900 ; Kermadec Islands.

Phæthon erubescens Mathews, Handl. Birds Austral., p. 38, 1908 ; Hull, Proc. Linn. Soc. N.S.W., Vol. XXXIV., p. 672, 1909 ; Iredale, Emu, Vol. X., p. 10, pls. iii., iv., 1910.

THE BIRDS OF AUSTRALIA.

Phaethon rubricaudus novæhollandiæ Mathews, Nov. Zool., Vol. XVIII., p. 243, 1912 ;
Iredale, Trans. New Zeal. Inst., Vol. XLV., 1912, p. 86, 1913.

Scæophæthon rubricauda novæhollandiæ Mathews, List Birds Austr., p. 100, 1913.

DISTRIBUTION. [North-eastern Australia ?] Raine Island ; Lord Howe Island ; Norfolk Island ; Kermadec Islands.

Adult male. General colour pinkish-white, a black patch from the angle of the mouth, extending upwards to the eye and behind it ; centre of flank-feathers and secondaries black ; long central tail-feathers red with black shafts. Bill red ; eyes brown ; feet light grey and black. Culmen 68 mm., wing 347, tail 112, middle feathers not included, tarsus 31 (Lord Howe Island).

Adult female. Similar to the adult male.

Nestling. Covered with whitish down.

Nest. A depression in the sand, placed under a shelving rock.

Eggs. Clutch one ; white, covered more at the top end with purplish-black, or covered with purplish-black all over. Axis 68-70 mm. ; diameter 48-49.

Breeding-season. July (Raine Island) ; November, December and January (Kermadec, Lord Howe and Norfolk Islands).

THOUGH birds from New South Wales are listed in the *Catalogue of the Birds in the British Museum*, Vol. XXVI., as received from the Australian Museum, Sydney—North, the ornithologist of that Museum, would not accept the accuracy of the labelling and has met with no record of the bird on the New South Wales coast. Stragglers might arrive from Lord Howe Island, the nearest breeding locality.

The species, however, breeds at Raine Island, North Queensland, and as no series are available, these are regarded as referable to the bird found breeding on Lord Howe, Norfolk, and the Kermadec Islands. Quite a literature has been compiled about these latter, and I quote first the two notes relating to the Raine Island bird, both recorded by the Macgillivrays, with an interval of fifty years between them.

Gould quoted Macgillivray the elder's notes thus: "This Tropic bird was found by us on Raine's Islet, where, during the month of June, about a dozen were procured. Upon one occasion three were observed performing sweeping flights over and about the island, and soon afterwards one of them alighted. Keeping my eye upon the spot, I ran up and found a male bird in a hole under the low shelving margin of the island bordering the beach, and succeeded in capturing it after a short scuffle, during which it snapped at me with its beak, and uttered a loud, harsh, and oft-repeated croak. It makes no nest, but deposits its two eggs on the bare floor of the hole, and both sexes assist in the task of incubation. It usually returns from sea about noon, soaring high in the air, and wheeling round in circles before alighting. The eggs are blotched and speckled with brownish-red

RUDDY TROPIC BIRD.

on a pale reddish-grey ground, and are two inches and three-eighths long by one inch four eighths and a half broad. The contents of the stomach consisted of the beaks of cuttle-fish. The only outward sexual difference that I could detect consists in the more decided roseate blush upon the plumage of the male, especially on the back, but this varies slightly in intensity in different individuals of the same sex and fades considerably in a preserved skin."

In the *Emu*, Vol. XIII., p. 148, 1914, Macgillivray the younger recorded: "When Dr. Dobbyn and I paid our very brief visit to Raine Island in October, 1910, we must have overlooked the caves in which these birds are in the habit of nesting. Mr. M'Lennan's notes are as follows: '9th July, 1911.—Had a look for Tropic-Birds under the ledges of rock and found three nests. The first contained a half-grown young bird, the second one egg, the nest being a shallow depression in the sand 4 feet under the rock; the third contained one small young bird not long hatched. 10th July, 1911.—Examined all the holes and caves round the edge of the island. The first containing a Tropic-Bird's nest with one egg was at the back of a fair-sized cave, 20 feet long, 12 feet broad, and 4 feet high. The opening of the cave was 9 feet across by 18 inches high. Another nest under a small ledge of rock contained one small young bird. Did not find any more. Crawling into the caves was not exactly a pleasant game. The air in some of them was very foul, and a match would only just burn in it, and as a rule one or two Pectoral Rails would be found in each. As I crawled into them the Rails would make a dash out, and two of them gave me such a start by striking me in the face that I tried to stick my head through the several feet of coral rock that formed the roof of the cave. Found another nest in a cave in the centre of the island. The bird was sitting on it, but had not yet laid. This bird deserted the nest without laying. 15th July, 1911.—Went round the caves again, and found another Tropic-Bird's nest containing an egg. Saw one of these birds flying round the island: it had two long tail-feathers. When on the ground these birds cannot walk—they can only shuffle along. When on the wing the feet are kept out at a slight angle from the body with fully outspread webs, and are very conspicuous. 27th July, 1911.—No Tropic-Birds at Bramble Cay.'"

The succeeding notes refer to the birds breeding in the Kermadecs, Lord Howe and Norfolk Islands.

Crowfoot, in the *Ibis* 1885, p. 268, and Cheeseman, *Trans. New Zeal. Inst.*, Vol. XXIII., 1890, p. 223, 1891, gave brief notes, mainly descriptions of the eggs.

THE BIRDS OF AUSTRALIA.

In the *Austr. Mus. Mem.*, no. 2, on Lord Howe Island, 1889, Etheridge noted (p. 16): "The Tropic Birds are represented at Lord Howe by *Phæton phænicurus* Gould, known as the Red-tailed Tropic or Boatswain Bird. We observed them on the west side of Mount Ledgebird and on the seaward precipitous face of the North Ridge. It is a remarkably shy and difficult bird to obtain." On p. 17 it is included with a footnote: "Seen, but not captured." On p. 47 North, under the name *Phæton rubricauda*, wrote: "This bird is found breeding during November and December; its single egg is laid under the shelter of projecting ledges of almost inaccessible rocks, on the face of cliffs, and are consequently very difficult to procure," and he then described the eggs.

Hull, in the *Proceedings Linn. Soc. N.S.W.*, Vol. XXXIV., 1909, p. 672, used the name *Phæton erubescens*, observing: "This variety of the Tropic Bird is distinguished by a rosy tinge, which fades from the feathers unless kept from the light. It breeds in considerable numbers on the almost inaccessible cliffs of both groups (Lord Howe and Norfolk Islands). On the occasion of my visit to Phillip Island (3rd November, 1908) the birds were commencing to select their nesting-places. From the top of the Peak I looked down a sheer cliff, 900 feet to the ocean, and saw these magnificent birds in hundreds sailing and wheeling about in their stately manner, with the scarlet tail-feathers streaming behind their glossy white bodies, while they filled the air with their cry of 'Honk, Honk,' resembling that of the Solan Goose. A few birds were sitting in the crevices in pairs. Mr. Lindsay Buffett informed me that on Phillip Island this bird lays one egg only on a ledge, in a crevice, or on the sand under an overhanging boulder, from the base to the top of the cliff. It is possible to reach some of the eggs by standing up in a boat brought in to the base of the cliff in very calm weather. Very few birds breed on Nepean Island and the smaller rocky islets. On Lord Howe Island it breeds on the cliffs of the main island. The breeding-season at both groups extends from the end of November to the end of January."

The following notes refer to typical *erubescens* of Rothschild, and I would observe that specimens from the Kermadecs are ruddier than from any other locality and can be separated at sight by means of the coloration alone. There is no doubt that the coloration of this form is retained even without the extraordinary precautions necessary to keep the fugitive colour seen in every other subspecies, and it may be that the Kermadec form may be eventually clearly defined as a distinct subspecies.

"The Red-tailed Tropic Bird from the Kermadecs has been previously recorded under the specific title of *rubricauda* Bodd. Rothschild has

RUDDY TROPIC BIRD.

separated a bird under the name *erubescens*, and this is the bird that bred on the Kermadec group. A striking characteristic is the bright pink coloration of the upper and lower parts, which in *rubricauda* are snowy white. As the bird floated in the sunshine the pink gleam was very lovely, and to some degree its loveliness compensated for the harsh nature of its cries. The long red tail-feathers seem to be the delight of its life; it passes most of its time in displaying these to the best advantage to its neighbour, who, in turn, endeavours to surpass it, each accompanying its evolutions with hoarse cries. The bird even moults these feathers one at a time, and is consequently never without one. If, when sitting, it is approached, and both tail-feathers are pulled out, it will sulk until the feathers have grown. It is a most erratic breeder, but I was unable to observe the time of incubation. On 4th January eggs were fresh as well as hard-set, whilst one young one was already hatched. A young bird, fully feathered, was picked up on the beach the first week of April, and then in the last week fresh eggs were seen. I do not think the young would have been reared even if they were hatched out of these eggs. No birds were noted during June or July, but the beginning of August once more saw them back in their stations. The birds nested on grassy ledges on the sea-cliffs all round the coast. The down of the young varied from pale dove-grey to pure white." (Iredale, *Emu*, Vol. X., p. 10, 1910.)

Later, using the name *Phaethon rubricauda novæhollandiæ*, Iredale commented: "The subspecies is well differentiated by its larger size and brighter coloration."

The first record of this species as Australian appears to be when Latham in the *General History of Birds*, Vol. X., p. 448, 1824, described the New Holland Tropic Bird.

"New Holland Tropic Bird.

"In a collection of drawings from New Holland is a black-billed one, said to be a young Tropic Bird, but without any elongated tail-feathers: length to the end of the tail eighteen inches. This corresponds with our second as to plumage, but differs in having the legs yellow instead of black, and no markings of black whatever on the thighs or under-parts, and the inner coverts of the wings only spotted with black, but the quills have a sagittated dash of black; at the end of each is a streak of black, continued from the black web; the tail-feathers are also crossed with three or four bars of black. A specimen of this last has not yet been seen here, but from every appearance it is most probably a distinct species." To this description Brandt gave the name *Phaethon novæhollandiæ*.

THE BIRDS OF AUSTRALIA.

This description is of a young bird, and when Sharpe investigated the Watling Drawings (*Hist. Coll. Nat. Hist. Brit. Mus.*, Vol. II., 1906) on p. 154, he wrote:

"No. 294. [Young Tropic-bird.]

New Holland Tropic Bird, Lath., *Gen. Hist. B.*, X., p. 448.

Phaëton melanorhynchos Stephens, *Gen. Zool.*, XII., pt. 1., p. 127.

Phaëton rubricauda (Bodd.) Grant, *Cat. B.*, XXVI., p. 451.

Watling says: 'From the extremity of the bill to the tail is eighteen inches.'

No. 295. Red-tailed Tropic-bird, Lath., *Gen. Syn.*, Vol. III., pt. 2, p. 614, pl. cv.

Phaëton rubricauda (Bodd.) Grant, *Cat. B.*, Vol. XXVI., p. 451.

Watling says: 'This bird is from the tip of the bill to the rump eighteen inches, and from the rump to the end of the tail-feathers eighteen inches.' "

The synonymy quoted by Sharpe with regard to No. 294 is not correct, as *Phaëton melanorhynchos* was not first proposed by Stephens but by Gmelin, and the name was not given to the New Holland Tropic Bird of Latham, but to the Black-billed Tropic Bird of the same author. That was not figured by Watling, as it came from Turtle and Palmerston Islands and will be later on noticed.

The Watling figures were all of Australian birds, and as Brandt gave a name *Phaëton novæhollandiæ* to Latham's description that name must come into use if none earlier be available.

Rothschild's subspecific name *erubescens* had been used for some years, but I recognised that Brandt's name should supersede it, and therefore in the *Nov. Zool.*, Vol. XVIII., p. 243, 1912, I reinstated Brandt's name for this form giving as reasons: "Note.—This name was given to the bird described by Latham as the 'New Holland Tropic Bird' in the *Gen. Synop. Birds*, Vol. X., p. 448, no. 4. The drawing there referred to is one of the Watling Drawings in the British Museum, and is obviously the young of this species. The next drawing is a splendid one of this species, and the artist carefully noted that the former was the young of the latter. As Watling included many Norfolk Island and Lord Howe Island birds in his drawings, and was certainly at these islands, there can be little doubt that he collected the birds he drew. I have therefore selected Lord Howe Island as the typical locality. Rothschild's name must become a synonym."

The history of Rothschild's name is as follows:

In the *Avifauna of Laysan*, Vol. III., pp. 294-296, that worker gave detailed measurements of specimens of the Red-tailed Tropic Bird from the

RUDDY TROPIC BIRD.

Kermadec Islands, Pacific Ocean, Niihau, Mauritius, and Christmas Island, Indian Ocean, writing: "Comparing my series of Red-tailed *Phaëthons* from various localities, I find them to belong to two well-marked forms. While my series from Laysan and Niihau, and two caught in the Pacific Ocean at lat. $21^{\circ} 10' N.$, long 115° , belong to a smaller form, with narrower and slenderer beak, shorter wings, and with a very slight rosy tinge, the birds from the Kermadec group, Norfolk and Lord Howe's Islands—in short from the islands to the north of New Zealand—are larger, with a thicker, stronger and longer bill, and have a very pronounced rosy red tinge in their plumage, especially on the wings. This beautiful red tint is so strong, that even in skins which are about four or five years older than those recently collected by Schauinsland this colour is much stronger.

"The measurements given of specimens, no sexes stated, show the following variation:

Kermadec Islands ..	Bill 75-87	wing 330-360 mm.
Pacific Ocean ..	„ 78-87	„ 330
Laysan ..	„ 70-77	„ 305-325
Niihau ..	„ 70-80	„ 318-320

"The specimens in the British Museum from Mauritius and Round Island, near Mauritius, are not nearly as reddish as those from the Kermadec Islands, and their measurements are: bill 76-80, wing 320-336 mm.

"These birds belong therefore clearly to the typical *P. rubricauda*. The specimens from Norfolk Island in the British Museum agree with those from the Kermadec Islands, but the skins are not good. Those from Christmas Island (Indian Ocean) are rather reddish and measure: bill 73-75.5, wing 320-341 mm. They seem thus to be somewhat intermediate between the smaller and whiter and the larger and more reddish form, but a larger series must be studied to confirm the impression. In any case there are two distinct subspecies—one the typical *P. rubricauda*, the other, *Phaëthon rubricauda erubescens*, subsp. nov., differs from *P. rubricauda* in being larger, with stronger bill, and in having a more reddish plumage.

"Hab.: Kermadec, Norfolk, Lord Howe's Islands."

Rothschild then observed that two names quoted in the synonymy were of doubtful reference, viz., *P. melanorhynchos* Gmelin, suggesting this might be young of either *P. æthereus* or *rubricauda*, and *P. novæhollandiæ* Brandt, writing: "This refers also to a young *Phaëthon*, and can only be quoted with a big query under the head of one of the known species."

I have shown this must supersede Rothschild's *P. r. erubescens* and would now deal with Gmelin's *Phaëton melanorhynchos* (*Syst. Nat.*, p. 582,

THE BIRDS OF AUSTRALIA.

1789); this is based solely upon the Black-billed Tropic Bird of Latham, Syn. III., 2, p. 619, n. 2, which is thus described: "This is in size smaller than any of the former; length nineteen inches and a half. Bill three inches long, greatly compressed on the sides, and black; the plumage on the upper part of the body and wings interruptedly striated black and white; before the eye a large crescent of black; behind it a streak of the same; the fore-head and all the under-parts of the body pure white; the quills and tail marked as the upper-parts, but the ends of the first white, and most of the feathers of the last marked with dusky black at the tips; sides over the thighs striated black and white; legs black. This was found at Turtle and Palmerston Islands, in the South Seas, and is in the possession of Sir Joseph Banks."

Under the next species, the Red-tailed Tropic Bird, Latham wrote (p. 621): "This species of Tropic Bird has been met with in several places of the South Seas; *very common at Palmerston and Turtle Islands.*"

This fixes the identity of *Phaeton melanorhynchos* Gmelin as *P. rubricauda* Boddaert, and *P. æthereus* Linné are apparently antagonistic and are never found together in the same breeding locality. Consequently *P. melanorhynchos* refers absolutely to the immature of *P. rubricauda*. The name is older and would supersede *P. novæhollandiæ* unless it were referable to another subspecies. We have no series from Turtle or Palmerston Islands, but specimens from the Society Islands, the nearest locality geographically, do not show the rosy red of the Kermadec birds and consequently the name, like *Pelecanus palmerstoni* previously treated of, must be regarded as referring to an undefined subspecies until series are procured.

It will have been noticed that Rothschild treated Laysan birds as typical *P. rubricauda*, and wrote of the Mauritius specimens as: "These birds belong therefore clearly to the typical *P. rubricauda.*"

As a matter of fact, Mauritius is the type locality of *P. rubricauda*, and all comparisons must be based upon that fact.

In the *Austral Avian Record*, Vol. I., p. 88, 1912, I separated *Phaethon rubricauda westralis*, subsp. nov., as differing from *P. r. rubricauda* in its longer wing; it also agreed in size with my specimens of *P. r. erubescens* (*novæhollandiæ*), but differed in lacking the depth of rose coloration apparent in those birds. My birds came from Rottnest Island, West Australia; I would associate with them the Christmas Island (Indian Ocean) birds, as they fairly agree with the series available.

My own criticism of the British Museum specimens shows that the bill of the Mauritius bird is practically the same as that of the Kermadec form, though the wing is noticeably shorter.

RUDDY TROPIC BIRD.

The West Australian and Christmas Island (Indian Ocean) birds have rather shorter bills though longer wings, while the coloration separates them from the Kermadec birds, which are still larger.

Society Island birds differ in coloration from those of the Kermadecs, while from Rothschild's own data it is obvious that Laysan birds differ very appreciably in size and coloration from those of the Kermadecs and cannot be called *P. r. rubricauda*, but are nameless.

Bonin Island birds have a very short bill, 56 to 59 mm.; the plumage is whiter than Kermadec Island birds.

I therefore would recognise

SCÆOPHÆTHON RUBRICAUDA RUBRICAUDA Boddaert.

Mauritius; Assumption Island.

SCÆOPHÆTHON RUBRICAUDA WESTRALIS Mathews.

Rottneest Island, West Australia;

Christmas Island, Indian Ocean.

With a rosier coloration than the preceding; the bill rather smaller and the wing longer.

SCÆOPHÆTHON RUBRICAUDA NOVÆHOLLANDIÆ Brandt.

Kermadec Islands; Norfolk Island;

Lord Howe's Island; Raine Island;

Torres Straits.

With a deep rose coloration which separates this form at sight: the bill agreeing closely with that of the typical subspecies in size, but the wing noticeably longer.

P. r. erubescens Rothschild is a synonym.

SCÆOPHÆTHON RUBRICAUDA MELANORHYNCHUS Gmelin.

Turtle and Palmerston Islands, Pacific

Ocean; Society Islands.

This subspecies cannot yet be accurately defined, no topotypical examples being available; the specimens from the Society Islands, the nearest locality, agree in size with the preceding subspecies, but differ at sight in lacking the deep rose coloration.

SCÆOPHÆTHON RUBRICAUDA ROTHSCILDI, subsp. nov.

Laysan; Niihau.

Separated by its weaker bill and shorter wing from the Kermadec form, from which it differs also in coloration, as indicated by Rothschild and quoted above.

SCÆOPHÆTHON RUBRICAUDA BREVIROSTRIS, subsp. n.

Bonin Islands. Separated by its small bill which measures 56 to 59 mm. Collected 10th May, 1911. The eggs are also smaller, 59-62.5 by 43-44. August 1910.

SCÆOPHÆTHON RUBRICAUDA WESTRALIS.
WESTRALIAN RED-TAILED TROPIC BIRD.

(PLATE 231.)*

PHÆTHON RUBRICAUDA WESTRALIS Mathews, Austral Avian Record, Vol. I., p. 88, 1912;
Rottnest Island, West Australia.

Phaeton rubricauda Carter, Emu, Vol. III., p. 211, 1904.

Phaethon rubricauda Hill, *ib.*, Vol. X., p. 265, 1911.

Phaethon rubricaudus rubricaudus Mathews, Nov. Zool., Vol. XVIII., p. 243, 1912.

Phaethon rubricauda westralis Mathews, Austral Avian Record, Vol. I., p. 88, 1912.

Scæophæthon rubricauda westralis Mathews, List Birds Austr., p. 100, 1913.

DISTRIBUTION. Western Australia. (Extra limital).

Adult male. General colour both above and below silky white with a pinky hue; the feathers on the crown and nape have dark bases; a black patch in front and behind the eye; bastard-wing, primary-coverts, greater coverts and quills white tinged with pink, all the feathers having conspicuously black shafts; some of the innermost secondaries black broadly margined with white; the long flank-feathers white, lead grey on the inner portion of the outer webs, and those on the sides of the rump grey, broadly margined with white; tail-feathers pinky-white with black shafts becoming red on the elongated middle feathers. Bill orange-red, nostrils brown; feet and upper part of legs faint blue, rest black. Total length 520 mm.; culmen 67, wing 343, tail 92, middle feathers 442, tarsus 32.

Adult female. Similar to the adult male.

Nest. A depression on the ground.

Eggs. Clutch, one or two; similar to those of *S. r. novæhollandiæ*. Axis 63 mm.; diameter 48 (White).

Breeding-season. October to February.

THE occurrence of a Red-tailed Tropic Bird in Western Australia seems to have been first noticed by Campbell who, in his *Nests and Eggs of Australian Birds*, Vol. II., p. 994, 1901, included in the geographical distribution of *Phaethon rubricauda*: "Seas of West and North-west Australia," and added on p. 995—

"From the other side of the Continent Mr. G. K. Beddoes writes:
'Found Tropic Bird nesting on Pelsart Island (Abrolhos); month, February;

* The Plate is lettered *Phaethon westralis*.



H. Grönvold, del.

Witherby & Co.

$\frac{1}{4}$

PHAETHON WESTRALIS.
(AUSTRALIAN RED-TAILED TROPIC BIRD).

WESTRALIAN RED-TAILED TROPIC BIRD.

two eggs, both hard set. Following February two nests same kind were taken on Rat Island; two eggs in each. I could not rescue the eggs, not being the finder.' "

This statement as to the number of eggs agrees with that of the elder Macgillivray, but otherwise the majority of collectors record only one as a clutch.

The only note I have regarding this form is that by Mr. Tom Carter, who states: "The only specimen noted of this beautiful species was shot by me near Point Cloates on April 23, 1891, while it was hovering above a sheep camp near the beach. An old sailor and whaler, who worked for me a long time, assured me that on one occasion he had seen a small flock flying about the mouth of the River Swan at Fremantle, where the presence of such rare visitors caused much attention and remark among seafaring men."

I have discussed the status of this subspecies under the preceding form.

The bird figured and described is the type male collected on Houtman's Abrolhos, West Australia, in November, 1894.

GENUS—LEPTOPHÆTHON.

LEPTOPHÆTHON Mathews, Austral Avian Record, Vol. II.,
 p. 56, 1913 Type *L. dorotheæ*.
Lepturus Reichenbach, Nat. Syst. Vögel, p. vii., 1852 .. Type *L. lepturus*.
 (Not *Lepturus* Brisson, 1760, nor Swainson, 1838.)

SMALL Phæthons with strong bills, long wings, long tail, small legs and feet. In general features the species of this genus agree with *Scæophæthon*, but they differ appreciably in size. Proportionately the wing and tail are much longer, the tail being differently formed.

In *Scæophæthon* the culmen is more than half the length of the tail without the central pair of tail-feathers, which is less than one-third the length of the wing. In *Leptophæthon* the culmen is less than half the length of the tail as above, which is more than one-third the length of the wing.

The central tail-feathers in *Leptophæthon* are very long with the webs normal and fairly wide, and the pair next to the central pair are long and are twice the length of the outside pair, the tail being thus strongly wedge-shaped. In *Scæophæthon* the central pair are very long, but the webs are degenerate and are scarcely broader than the shaft, while the tail otherwise is wedge-shaped but without much gradation.

The metatarsus is less than a quarter of the length of the tail in *Leptophæthon*, while in *Scæophæthon* it is more than one-third.

The middle toe is never pectinate in this family.



H. Gronvold del

$\frac{1}{3}$

PHAETHON DOROTHEA.
(WHITE-TAILED TROPIC BIRD).

Witherby & Co

LEPTOPHÆTHON LEPTURUS DOROTHEÆ.

WHITE-TAILED TROPIC BIRD.

(PLATE 232.)*

PHÆTHON LEPTURUS DOROTHEÆ Mathews, Austral Avian Record, Vol. II., p. 7, 1913; Queensland.

Phæton lepturus North, Rec. Austr. Mus., Vol. III., p. 89, 1898; *id.*, *ib.*, Vol. VI., p. 343, 1907.

Phæthon lepturus Hall, Key Birds Austr., p. 103, 1899; Campbell, Nests and Eggs Austr. Birds, Vol. II., p. 995, 1901; Hall, Key Birds Austr., 2nd ed., p. 103, 1906; Mathews, Handl. Birds Austral., p. 39, 1908.

Phæthon lepturus lepturus Mathews, Nov. Zool., Vol. XVIII., p. 243, 1912.

Phæton lepturus dorotheæ Mathews, Austral Avian Record, Vol. II., p. 7, 1913.

Leptophæthon lepturus dorotheæ Mathews, List Birds Austr., p. 101, 1913.

DISTRIBUTION. Queensland; New South Wales.

Adult male. General colour above and below pearl white; a circular black line in front and over the eye which broadens out behind the latter; the feathers of the hinder crown and nape have dark bases; median upper wing-coverts black; primary-quills black on the outer web and, including the shafts, white at the tips, the black decreasing on the inner ones which have only a black shaft; outer secondaries white, inner ones black and white; scapulars white, subterminally black with white edges; rump and upper tail-coverts white with black bases and black shafts; tail-feathers white with black shafts; feathers on the sides of the rump black with white margins. Bill red; eyes white; feet black; tibia yellowish. Total length 400 mm.; culmen 44, wing 281, tail 115, middle feathers 380, tarsus 24.

Adult female. Similar to the adult male.

Nest. "A hole or hollow of a rock or tree-stump" (Campbell).

Eggs. "Clutch one; ground-colour buff, freckled all over with purplish-brown." Axis 57 mm.; diameter 44 (White, Fiji).

NOTHING is known of the life-history of this bird, as only stragglers have yet been recorded on the Queensland and New South Wales coasts.

Campbell, in his *Nests and Eggs Austr. Birds*, p. 995-1901, gave the following notes:

"*Geographical Distribution.* The coasts of West and North-west Australia, Northern Territory, Queensland, and New South Wales.

* The Plate is lettered *Phæthon dorotheæ*.

THE BIRDS OF AUSTRALIA.

“*Observations.* Although the White-tailed Tropic Bird is usually restricted to tropical waters, in Australia it has been observed as far south as Houtman’s Abrolhos, on the west coast, while on the east coast an immature specimen was blown ashore at Botany Bay (New South Wales) during February, 1898, after an occurrence of easterly gales.”

Otherwise I have traced no record on the West Coast, and it should be emphasized that no breeding-place of this species is known nearer than the Seychelles, and that on Christmas Island, Indian Ocean, the distinct and beautiful species, *Leptophætho fulvus* (Brandt) occurs. If *L. lepturus* has been procured on the West Coast it suggests that an Australian breeding locality may be looked for. Examination of the available material shows that though little difference in coloration can be observed, there is a very slight but appreciable difference in measurements. This is only as regards the three Oceans: the Atlantic, Indian and Pacific, but when long series are available many forms may be determined. This seems certain when we bear in mind that on Christmas Island, Indian Ocean, a most beautiful species lives which has varied only in attaining a uniform rich salmon throughout its plumage, the black markings remaining unchanged. Again, in the North Atlantic Ocean, the plumage has not materially altered in shade, yet the black markings on the primaries show sufficient differences to demand specific recognition.

Atlantic Ocean birds give measurements as follows: Ascension Island birds, the tail without the elongated tail-feathers.

			Culmen.	Wing.	Tail.	Middle Toe.
♂	..	..	51	265	102	30 mm.
♂	..	..	50	267	111	31
			48	256	109	30
			49	266	111	29
			47	266	114	31
Fernando Noronha specimens:						
♀	..	..	49	262	118	31
			46	266	119	30
			48 +	270	113	31
Indian Ocean birds give:						
Mauritius	..		48	269	120	29
			50	273	117	31
			44 +	275	112	32
			51	282	121	31
			48	270	116	30

WHITE-TAILED TROPIC BIRD.

		Culmen.	Wing.	Tail.	Middle Toe.
Rodriguez ♂	..	51	273	121	33
♂	..	46	265	120	31
♀	..	48	264	118	31
Pacific Ocean birds measure :					
Near Tongatabu	♀	41	261	108	28
Samoa		44	246	107	26.5
Samoa		47	263	111	29
Upolu, Samoa	..	46	258	105	27
Navigators I.	..	43	271	109	28
Pelew I.		42	258	104	28
N. of New Guinea		45	260	101	27

Criticism of the above figures show that the Pacific birds differ from the Indian Ocean birds in their slightly smaller size, the bill being somewhat noticeably so. Atlantic Ocean birds show small measurements like those of the Pacific, but have long bills like those of the Indian Ocean birds.

There are half a dozen names, but these were all introduced for the same form.

The earliest *Phæton lepturus* Daudin in *Buff. Hist. Nat. ed. Didot*, 18mo *Quadr.*, Vol. XIV., p. 319, 1802, was given to the bird described in *Oiseaux*, Vol. XVI., p. 280, which quoted the *Plan. Enlum.*, No. 369, and gave Mauritius as the type locality. This name was rescued from oblivion by Mr. C. D. Sherborn when engaged upon his monumental *Index Animalium*, and was indicated to Ogilvie-Grant, at that time monographing the Family in the *Catalogue of the Birds in the British Museum*; the latter, the opportunity being thus presented, became, for the time being, an ultra-prioritarian, and at once made use of Daudin's name, discarding as useless synonyms the familiar *Phæthon candidus* and *P. flavirostris*. These were based upon the same plate and description, so that this action was absolutely correct.

Phæton albus was proposed by Schinz and Brodtmann, *Naturg. u. Abbild Vogel. Gattungen*, p. 402, 1830. The description is very brief and no locality is given. I therefore designate Mauritius, and this will become a synonym of Daudin's *P. lepturus*.

Brandt, in the *Mem. l'Acad. Imp. Sci. St. Petersb.*, Ser. 6, Vol. V., pt. 2, 1840, monographed the Phæthons, and on p. 270 proposed *Phæthon catesbyi* for the bird described and figured in Catesby's *Nat. Hist. of Carol.*, Vol. II., Edwards' Edition, p. 114, pl. 14, 1771, and on p. 271 *Phæthon edwardsii* for the bird described and figured by Edwards, *Nat. Hist. Birds*, part III., p. 149, tab. 149, 1750.

THE BIRDS OF AUSTRALIA.

The latter of these names was cited by Ogilvie-Grant as a synonym of *Phæthon lepturus* Daudin, but the former was placed under *Phæthon æthereus* Linn. The quaint part of this latter action is that the plate upon which Brandt's *P. catesbyi* was founded was quoted as representing the species which Ogilvie-Grant had named *Phæthon americanus*.* The locality and description as well as the excellent figure given by Catesby show Ogilvie-Grant's reference of Catesby's account to the bird he had named *Phæthon americanus* to be correct. But the necessary sequence of this conclusion is the acceptance of Brandt's name and the rejection of Ogilvie-Grant's. That is, the name of the Bermuda breeding Tropic Bird is *Phæthon catesbyi* Brandt, and *Phæthon americanus* Ogilvie-Grant becomes an absolute synonym. As the type locality of Brandt's species I fix Bermuda, the locality whence Catesby himself procured specimens. The name *Phæthon edwardsii* was given to Edwards' account and plate and no locality is mentioned. As the most probable localities for Edwards' bird are the West Indies or Mauritius, the most reasonable method seems to be the arbitrary selection of the latter and *Phæthon edwardsii* will become an absolute synonym of *P. lepturus* Daudin.

The species and forms, then, of the genus *Leptophæthon* would read:

LEPTOPHÆTHON FULVUS (Brandt).

Christmas Island (Indian Ocean).

As a synonym, Lawrence's *P. flavo-aurantius* may be noted as commonly recognised.

LEPTOPHÆTHON CATESBYI (Brandt).

Bermuda (breeding); West Indies.

This name will replace *Phæthon americanus* Ogilvie-Grant. Ogilvie-Grant's name was utilised by the American Ornithologists in their *Checklist*, 3rd ed., p. 59, 1910, because they had accepted Bonaparte's reference of *P. catesbyi* to the synonymy of *P. æthereus* Linné, though they should have known that only one species of Tropic Bird bred on the Bermudas, and that was not *P. æthereus*. Had they referred to Catesby's work, the figure was quite sufficient to negative the association of Brandt's name with *P. æthereus* Linné. Catesby described the bill as "red"; this species is known as the Yellow-billed Tropic Bird. Recently Karl Platt in the *Ibis* 1914, p. 554, has confirmed Catesby's observation made one hundred and seventy years ago, noting that the birds have red bills when alive. I suggest the replacing of the misleading vernacular by the name Catesby's Phæthon or Tropic Bird.

This bird is only separable by its slightly large size and the variation in the black markings of the primaries. In most genera such trifling differences

* cf. Mathews, *Auk* 1915, p. 195.

WHITE-TAILED TROPIC BIRD.

would only be regarded as of subspecific value, but when dealing with Ancient Forms such as the present, these must be given higher value. I therefore regard it as a valid species, as the Ascension Island birds scarcely seem to differ in any details save measurements from those of the Pacific Ocean.

LEPTOPHÆTHON LEPTURUS (Daudin).

Atlantic, Indian and Pacific Oceans.

I recognise one subspecies at present from each Ocean, but series would probably enable the differentiation of more.

LEPTOPHÆTHON LEPTURUS LEPTURUS (Daudin).

Mauritius ; Rodriguez.

As synonyms should be noted: *Phæthon candidus* Temminck, *Phæthon albus* Schinz and Brodtmann, *Phæthon flavirostris* Brandt and *Phæthon edwardsii* Brandt.

LEPTOPHÆTHON LEPTURUS DOROTHEÆ Mathews.

Queensland ; Pacific Ocean.

Differs from *L. l. lepturus* Daudin in its smaller size throughout. Measurements: Culmen 41-47; wing 246-271; tail, 101-111; middle toe 26.5-29 mm. Ditto of *L. l. lepturus* Daudin from Mauritius: culmen 48-51; wing, 269-282; tail 116-121; middle toe 29-32 mm. The bird with the longest wing from the Pacific Ocean, viz. 271 mm., has a bill measuring 43 mm. only, and the bird with the shortest wing from Mauritius, viz. 269 mm., has the bill 48 mm.

Rodriguez birds seem slightly smaller than typical Mauritius ones; culmen 46-51; wing 264-273; tail 118-121; middle toe, 31-33 mm.

LEPTOPHÆTHON LEPTURUS ASCENSIONIS, subsp. n.

Ascension Island (type); Fernando Noronha.

Ascension Island birds differ from typical *P. l. lepturus* Daudin in their smaller wing measurement, though otherwise fairly agreeing. Culmen 47-51; wing 256-267; tail 102-111; middle toe 29-31 mm. These differ from the preceding in their slightly longer bills and middle toe.

Three birds from Fernando Noronha give: culmen 46-49; wing 262-270; tail 113-119; middle toe 30-31 mm.

The tail measurements throughout are for the tail without the two central feathers.

The bird figured and described is the type, collected near Cairns, Queensland, in October, 1906.

GENUS—CATOPTROPELICANUS.

CATOPTROPELICANUS Reichenbach, Nat. Syst.

Vögel, p. vii., 1852 Type *C. conspicillatus*.

LARGE Pelecanine birds, characterised by their feathered lores. All other members of the Family have the lores naked.

The Family is diagnosed by the huge bill with broad flattened upper mandible and immense gular pouch; the birds are very large, heavily built, with long wings, medium neck, short tail, and short stout legs and feet. The bill is very long, broad and flattened: the culminicorn consists of a flattened portion, continuous with the small sharply-hooked nail; the laterals are cleanly divided by a narrow groove, at the base of the culmen almost concealing the linear nostrils; the laterals broaden and flatten past the middle; the rami of the lower mandible are vertical, thick and strong at the base, where they extend beyond the upper mandible edges, but becoming slender about the middle, where they are overlapped by the upper edges; the nail is short and hooked; the interramal region develops a huge distensible naked pouch.

The culmen is about two-thirds the length of the wing. The lores are feathered, but the eyes are surrounded by a bare patch: a breeding-crest is assumed.

The wings are long, the third primary longest, the fourth longer than the second, the first about equal to the fifth; the wing-coverts long and lanceolate.

The tail is short, wedge-shaped, composed of twenty-two feathers, and is less than half the length of the culmen.

The legs are short and stout, reticulate throughout, but the scales smaller on the back; the metatarsus is more than half the length of the tail but less than one-third the length of the culmen.

The toes are long, scutellate, the hind toe long, the middle toe longest, all connected by webs.

In the *Catalogue of the Birds in the British Museum*, Vol. XXVI., Ogilvie-Grant admitted a Family *Pelecanidæ*, covering the genus *Pelecanus* only. The main reason for this classification was the size of the birds and the few species existent. Otherwise characters of good generic value were recognisable,

CATOPTROPELICANUS.

and as long ago as 1852 Reichenbach (*Nat. Syst. Vogel*, 1852, p. vii.) had subdivided the genus thus:—

“ <i>Cyrtopelicanus</i> Rchb.	<i>trachyrhynchus</i> Lath.
<i>Leptopelicanus</i> Rchb.	<i>fuscus</i> L. Gm.
<i>Catoptropelicanus</i> Rchb.	<i>perspicillatus</i> R. (Temminck).
<i>Onocrotalus</i> Gesn.	<i>gesneri</i> Rzaczynski.”

Whether the other sections provided by Reichenbach are of value or not, the one proposed for the Australian species certainly demands generic recognition, as it differs from all other Pelicans in having feathered lores. Such a character in a bird of this kind indicates a great differentiation in the progress of evolution, and instead of being minimised should be emphasized as it once more throws into relief the peculiar nature of the Australian Avifauna. It is unfortunate that Reichenbach should have provided such a lengthy name for this form, but the usage of his invention cannot be avoided.

CATOPTROPELICANUS CONSPICILLATUS.

AUSTRALIAN PELICAN.

(PLATE 233.)*

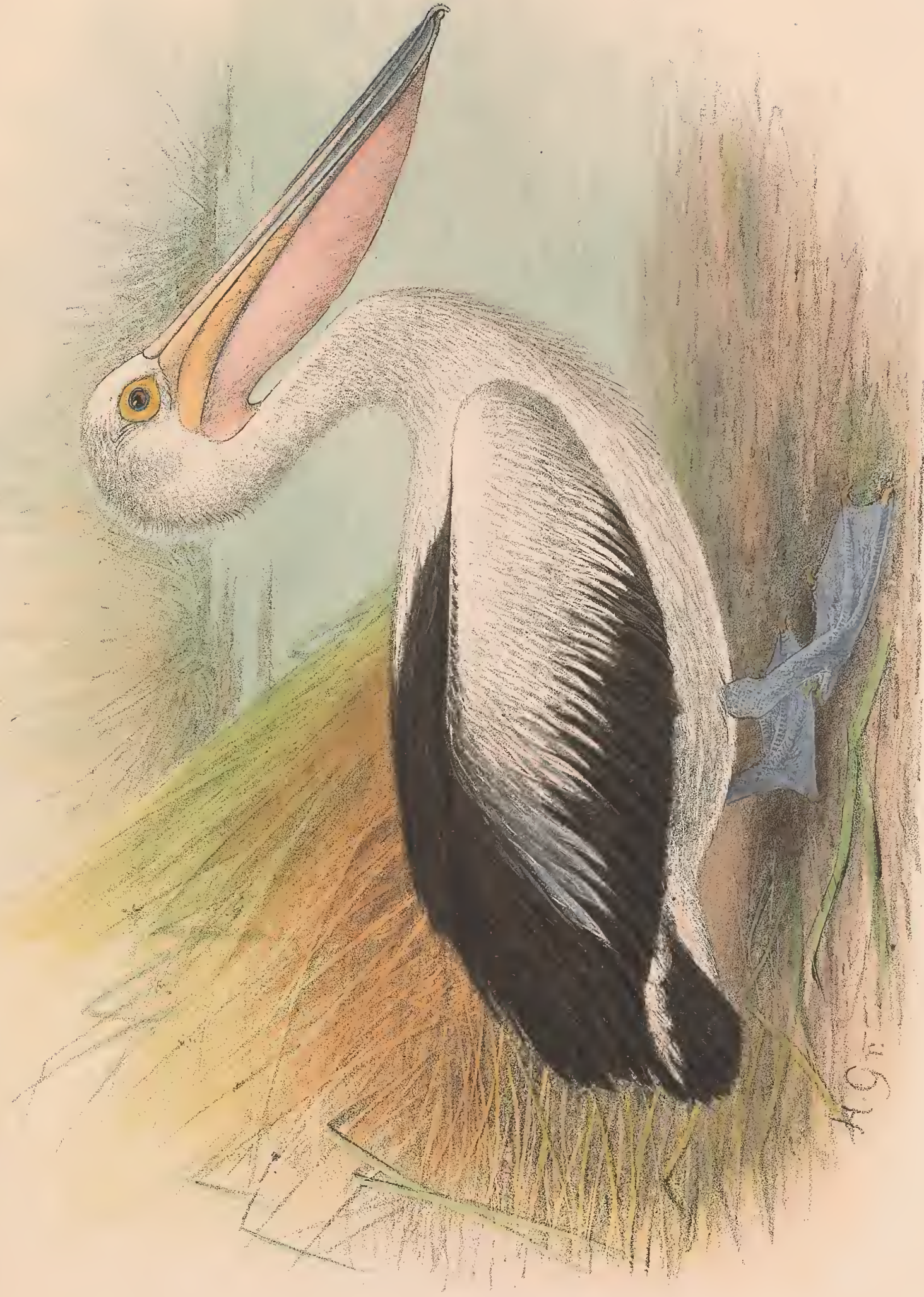
PELECANUS CONSPICILLATUS Temminck et Laugier, Planch. Color d'Ois., 47^e livr., Vol. III., pl. 276, 1824; New South Wales.

New Holland Pelican Latham, Gen. Hist. Birds, Vol. X., p. 402, 1824.

Pelecanus conspicillatus Temminck et Laugier, Planch. Color d'Ois., 47 livr., Vol. III., pl. 276, 1824; Lesson, Traité d'Orn., p. 602, 1831; Drapiez, Dict. Sci. Nat., Vol. VIII., p. 385, 1842; Gray, List Birds Brit. Mus., pt. III., p. 189, 1844; *id.*, Genera Birds, Vol. III., p. 668, 1845; Gould, Birds Austr., Vol. VII., pl. 74, 1847; Macgillivray, Narr. Voy. "Rattlesnake," Vol. II., p. 359, 1852; Bonaparte, Consp. Gen. Av., Vol. II., p. 161, 1856; Elsey, Proc. Zool. Soc. (Lond.) 1857, p. 28, Schlegel, Mus. Pays-Bas, Vol. VI., Pelec., p. 36, 1863; Gould, Handb. Birds Austr., Vol. II., p. 486, 1865; Ramsay, Ibis 1866, p. 335; Elliot, Proc. Zool. Soc. (Lond.) 1869, p. 590; Gray, Handl. Gen. Sp. Birds, pt. III., p. 130, 1871; Pelzeln, Ibis 1873, p. 53; Ramsay, Proc. Zool. Soc. (Lond.) 1877, p. 348; Diggles, Birds Austr., Vol. II., pl. and p. 119, 1877; D'Albertis, Ibis 1877, p. 372; Salvadori, Orn. Papua. e Moll., Vol. III., p. 414, 1883; Legge, Papers and Proc. Roy. Soc. Tasm. 1886, p. 244, 1887; *id.*, *ib.*, 1887, p. 96, 1888; Ramsay, Tab. List Austr. Birds, p. 25, 1888; North, Aust. Mus. Cat., no. 12, p. 368, 1890; Le Souëf, Ibis 1895, p. 423; Reichenow, Journ. fur Orn., 1897, p. 216; Ogilvie-Grant, Cat. Birds Brit. Mus., Vol. XXVI., p. 483, 1898; Hall, Key Birds Austr., p. 104, 1899; Campbell, Nest and Eggs Austr. Birds, Vol. II., p. 997, 1901; Lyons, Emu, Vol. I., p. 137, 1902; Hill, Emu, Vol. II., p. 167, 1903; Dove, *ib.*, Vol. V., p. 87, 1905; Hall, Key Birds Austr., p. 104, 1906; Berney, Emu, Vol. VI., p. 155, 1907; Batey, *ib.*, Vol. VII., p. 17, 1907; Austin, *ib.*, p. 78, 1907; Mathews, Handl. Birds Austral., p. 39, 1908; Mellor, Emu, Vol. VII., p. 186, 1908; S. A. White, Emu, Vol. VIII., p. 199, 1909; Hill, *ib.*, p. 223, 1909; Littler, Handb. Birds Tasm., p. 202, 1910; Macgillivray, Emu, Vol. X., p. 217, 1910; Broadbent, *ib.*, p. 245, 1910; Stone, *ib.*, Vol. XII., p. 121, 1912; Mellor and White, *ib.*, p. 161, 1913; Stone, *ib.*, Vol. XIII., p. 83, 1913; Agnew, *ib.*, p. 94, 1913; S. A. White, *ib.*, p. 124, 1914; Macgillivray, *ib.*, p. 149, 1914.

Pelecanus australis Stephens, in Shaw's Gen. Zool., Vol. XIII., pt. I., p. 113, 1826.

* The Plate is lettered *Pelecanus conspicillatus*.



H. Grönvold, del.

Witherby & Co.

$\frac{1}{5}$
PELECANUS CONSPICILLATUS.
(EASTERN PELICAN).

AUSTRALIAN PELICAN.

Catoptropelicanus perspicillatus Reichenbach, Nat. Syst. Vögel, p. vii., 1852.

Catoptropelicanus conspicillatus Heine, Nomencl. Mus. Hein., p. 351, 1890; "Rehb."

Ogilvie-Grant, Cat. Birds Brit. Mus., Vol. XXVI., p. 483, 1898 (in synonymy).

Pelecanus conspicillatus conspicillatus Mathews, Nov. Zool., Vol. XVIII., p. 244, 1912.

Caloptropelicanus conspicillatus conspicillatus Mathews, List Birds Austr., p. 101, 1913.

The following synonyms refer to the Western Bird :

Pelecanus conspicillatus Elsey, Proc. Zool. Soc. (Lond.) 1857, p. 28; Walker, Ibis 1892, p. 257; Carter, Emu, Vol. III., p. 210, 1904; Kilgour, Emu, Vol. IV., p. 38, 1904; Nicholls, Emu, Vol. V., p. 82, 1905; Gibson, Emu, Vol. VIII., p. 64, 1908; Whitlock, *ib.*, p. 194, 1909; Crossman, *ib.*, Vol. IX., p. 149, 1910; Mathews, *ib.*, p. 239, 1910; Ogilvie-Grant, Ibis 1910, p. 171; Hill, Emu, Vol. X., p. 265, 1911; Barnard, *ib.*, Vol. XI., p. 20, 1911; Hill, *ib.*, Vol. XII., p. 254, 1913; Barnard, *ib.*, Vol. XIV., p. 41, 1914.

Pelecanus conspicillatus westralis Mathews, Nov. Zool., Vol. XVIII., p. 244, 1912 (Perth, West Australia).

Catoptropelicanus conspicillatus westralis Mathews, List Birds Austr., p. 101, 1913.

DISTRIBUTION. Australia; Tasmania.

Adult male (in breeding plumage). Head and neck all round, entire under-surface, middle of back, upper and under wing-coverts white; the small coverts along the inner margin of the wing black, median and greater upper wing-coverts also black with white on the outer webs of the greater series; bastard-wing, primary-coverts and quills black, some of the secondaries white at the base; scapulars black, extreme basal portion white; sides of the rump and some of the upper tail-coverts black; tail-feathers black, white only at the extreme base; nuchal crest more or less greyish-brown; a few of the under wing-coverts black, others partially black and white; ornamental feathers on the fore-neck well developed. Bill, culmen flesh-colour, grooves and tip and sides of upper and lower mandible slate-blue, nail of upper mandible greenish horn-colour, pouch pale flesh-colour; eyes dark brown, eyelids deep indigo blue; feet light slate-colour. Total length 1,620 mm.; culmen 464, wing 653, tail 180, tarsus 126.

Adult female. Similar to the adult male.

Immature. Differs from the adult in having the dark portions of the upper-surface brown instead of black.

Nestling. Naked, skin fleshy-pink.

Nest. A slight depression in the ground; placed in colonies.

Eggs. Clutch two, white and chalky, surface uneven and glossless. Axis 87-94 mm.; diameter 56-58.

Breeding-season.—July to November.

THOUGH Pelicans are sometimes noted by the early voyageurs, none seem to have been brought back to England, and apparently the first observation was made upon the figure provided by Watling. When Latham examined the Watling Drawings he simply referred "Drawing No. 292," which

THE BIRDS OF AUSTRALIA.

represents this species, to the White Pelican, *Gen. Synops.*, Vol. III., p. 575, as a variety. Later, he reconsidered the matter, and in the *General History of Birds*, Vol. X., p. 402, 1824, described it as a new species, thus:

“New Holland Pelican. Length five feet, extent of wings seven. Bill, and round the eye, yellow; plumage in general white; the beginning of the back, the quills, and tail, black; inner half of the lesser wing-coverts white; legs pale blue; webs dusky; the quills reach to above the middle of the tail. Inhabits New Holland, known by the name of Karrang-aba.”

To this description, two years later, Stephens gave the name *Pelecanus australis*, but, simultaneously with Latham's description, Temminck had figured and named a specimen *Pelecanus conspicillatus*. Though many notes are available regarding this bird, it cannot yet be said that its life-history is well known. Its large size attracts attention, but little study appears as yet to have been given to its habits.

Mr. A. H. Mattingley has written me: “Young are born blind, the skin of a fleshy-pink, somewhat glazed and transparent looking, and quite naked. The young are delicate and easily succumb if left any length of time by their parents on a cold day. In a large rookery Pelicans' eggs are scattered about, a great number being found away from the nests, some even being laid or have been carried to the water's edge. A pungent odour pervades the rookery. The young fight vigorously even when very small and unable to walk. They peck at an intruder if approached closely, meanwhile uttering a raucous sound of anger. The old birds are very shy and wary and usually clear out when anyone approaches the rookery. There is always a sentinel on guard, and although one might be a mile away in a boat the sentinel will usually fly over to inspect the intruders and then report to the main body of pelicans.”

Capt. S. A. White notes: “This grand and timid bird was met with on many parts of the Lake (Alexandrina, South Australia), and often in the early mornings were seen drifting down the passage all in line like battleships, presenting a glorious sight. These birds consume great quantities of an unedible fish called Bony Bream.”

Mr. J. W. Mellor has communicated the following: “The Pelican, I am glad to say, has not been quite driven away by the head hunters' raids of last year, and we hope to preserve its breeding-place at any rate. The three small islets in the Coorong, between Woods' Wells and Salt Creek, are the only places now in South Australia where these once plentiful birds breed. These islands with others have now been placed by the Commissioner of Crown Lands under the care and protection of the South Australian Ornithological Association, and it was in the interests of these birds that I took this trip of inspection and found them still breeding on Pelican Island,

AUSTRALIAN PELICAN.

Flat Pelican Island and Upper Pelican Island; these are but rocky islets with a little clay and sand over them, and a very few low bushes here and there, but very small, only about 100 yards long and twenty or thirty wide the largest. The Pelicans seem to go to one island first, and when sufficient have nested there, go to the next, etc., as on one island there were a number of young and no fresh eggs, the young being from those without a vestige of clothing to fully-fledged birds. It was on the 22nd September that we came up to the Pelican Islands, and dropping anchor a mile off, we manned the dinghy, and pulled to the shores of Flat Pelican Island; as we neared the island the old birds started to rise off the ground and mount into the air, while others waddled to the water's edge and slid into the water with a cumbersome gait, but none seemed to care to go far away as those that mounted heavenwards settled in the water a quarter of a mile off and floated about in a disturbed manner. There was a number of young about, and these herded together in little flocks like sheep, and as we landed, the largest ones gradually edged off into the water and swam to their parents on some rocks a short distance away, while the younger ones waddled and huddled together in a terrified manner as if expecting the worst was going to happen, but our mission was not 'head-hunting,' and we disturbed them as little as possible. When worried the young disgorge their food in all directions: they start by wobbling their large cumbersome heads and beaks about in a violent manner from side to side, and soon a fish or their food is vomited up, and then there is a rush of silver gulls to eat up the refuse. I noticed that beside fish the young pelicans are largely fed upon crustaceans, such as shrimps and small prawns, and therefore I am of the opinion that the young of the destructive fish crabs are also used as food, and so the pelican is a benefactor in disguise and should not be wantonly killed out by misguided fishermen who only look on the fish side of the bird's habits. It was not a place to wish to stay at long, as the repugnant odour given off by the decaying refuse and excreta of the young was far from pleasant, and we were glad to get to the boat again and push away into the sweet pure air. The next island was Pelican Island, which is about half a mile distant, and we soon landed there, where we found that the breeding was not so advanced, there being less birds here: a few small young had hatched out and there were also some clutches of well sat-upon eggs dotted about promiscuously on the flat patches of earth, where also a few black swans and silver gulls were also nesting in conjunction with the pelicans, and all apparently agreeing harmoniously together. The stench was also very bad here, and as the sun was nearing the horizon we deemed it expedient to get away again and let the old birds come back to their nests

THE BIRDS OF AUSTRALIA.

in peace. Next day we proceeded farther up the Coorong about a mile, and dropped anchor again, this time off Upper Pelican Island, and rowed ashore in the dinghy. Here we found that the pelicans had taken up their quarters more recently, as there were numbers of nests, some having the full clutch of two eggs, while others had but one fresh egg, and others again just scratched out ready to receive the eggs. Some eggs were well incubated, and others fresh. It was seventeen years since I visited these islands as described in Campbell's *Nests and Eggs of Australian Birds*, and I was very pleased to once more make the acquaintance of my old friends the pelicans. The nests were simply slight hollows scratched in the hard clay, there being no effort made to line this in any way, except that a very little down sometimes comes out of the birds and helps to soften the hard locality to a very small degree. The nests are placed in the open, and not in any sheltered places. Some state that three eggs is the clutch of the pelican, but I have seen hundreds of nests in my time, and I can safely say that two is the full clutch, and should there be three, which sometimes occurs, it is accidental, as it is the easiest thing in the world amongst these cumbersome birds for an egg to get rolled out, and then roll into the next nest. The eggs vary considerably in size and shape, some being long and narrow, while others are dumpy and short: they get very soiled when sat upon for long, as the dirt that is about gets mixed up in the nest, and the young from a neighbouring nest often waddles over another's eggs and disarranges them. The texture of the eggs is very coarse and limey: they are pure white when first laid, often having blood marks upon them, their rough nature scratching the intestine of the bird in the passage out; sometimes there are large lumps of lime sticking to the sides of the egg, and in others the lime is so thick, that when the bird places its rough foot upon the soft shell, a good impression is made on the shell, and as it hardens, it will remain on the shell until the young hatch out.

"The young are destitute of feathers or down until they are fairly well grown. The pelicans must have started breeding as early as July, and it would be well into December before the young would get away."

Berney's* observations of this bird in North Queensland read:

"There appears to be no regularity in the movements of the Pelicans that visit us, summer or winter, good seasons or bad. As often as not it is a solitary bird that is seen; from that to half a dozen, while in mid-winter of 1902 I saw between forty and fifty together, which constitutes my record mob for these parts. Their visits, though fairly frequent, are of short duration. When soaring in wide circles overhead, with wings outstretched

* *Emu*, Vol. VI., p. 155, 1907.

AUSTRALIAN PELICAN.

and motionless save for an occasional flap, they are a decidedly interesting sight."

Stone,* regarding the Birds of Lake Boga, Victoria, writes: "Very common; I have seen these showy birds massed in scores, following a shoal of small fish, and levying a very heavy toll thereon."

Again, in the *Emu*, Vol. XIII., p. 83, 1913, Stone added: "Rounding a bend in the swamp, we would come into view of a sand-spit on which would be perhaps over a hundred Pelicans (*Pelecanus conspicillatus*), "Nynungourk," sunning themselves after a successful fishing expedition. I have often seen hundreds of these birds together on a moonlight night, swimming after a shoal of fish. Their general habit at such times is to bunch together, shoulder to shoulder, and they make a great commotion, eating the fish and swimming at great speed. The Pelican's power of vision is very great, and in passing from one sheet of water to another at any distance it reaches a great altitude, and soars on outspread wings in spirals before departing, and again previous to alighting. My observations go to prove that these birds, in their natural state, feed principally upon small fish, though not disdaining a larger one if in the way. A wounded bird will sometimes disgorge a hatful of small fish. The Pelican swims very high in the water."

Macgillivray, writing about North Queensland birds in the *Emu*, Vol. XIII., p. 149, 1914, stated: "Noted in fair numbers throughout the Gulf country, many of the waterholes and lakes containing flocks of twenty or more. All these rivers abound with fish, so that they are always assured of a good supply of food. They were frequently seen on Channel Rock, in Torres Strait. A large flock was also noticed on the swamp between Cripple Creek and Georgetown, where the Native Companions were congregating."

Dr. J. C. Cleland states the stomachs of five specimens gave results as follows:

- "1. Nearly two pints of prawns, with fish about two inches long.
2. Freshwater crayfish and a few shrimps; small fish; tapeworm in intestines.
3. Freshwater crayfish.
4. Freshwater crayfish.
5. Freshwater crayfish and several small fish, one four and a half inches long.

A large number of round worms about an inch and a half long in stomachs of all specimens."

* *Emu*, Vol. XII., p. 121, 1912.

THE BIRDS OF AUSTRALIA.

Many other notes are on record, but apparently none detailing the habits of the bird, but merely notices that the bird is common or rare, and consequently little is known of its life-history. As this is a bird which will certainly suffer rapidly from the advance of civilisation, it is obvious that action should be taken at once, and its habits fully recorded before it is too late.

The bird figured and described is a male collected on the Fish River, New South Wales, on the 6th of January, 1910.

The following notes refer to the Western bird :

The first note regarding this form seems to be that by Elsey, who in a letter from the Victoria River Dépôt, North Western Australia [Northern Territory] published by Gould in the *Proc. Zool. Soc. (Lond.)* 1857, p. 28, observed: "The pelican is white, with black wings, and a very fine blue-and-purple margin round the pouch. It is, I presume, *Pelecanus conspicillatus*. Its breeding-season is March and April."

Mr. Tom Carter has written me: "The Pelican occurs commonly throughout Western Australia, wherever the food supply and surroundings are suitable. In the centre of the Princess Royal Harbour at Albany a flock could almost always be seen; in the vicinity of, or resting upon a sand bank that afforded a clear view all round. On the sandbanks about the estuary of the great Gascoyne River at Carnarvon, as many as two hundred can frequently be seen in a flock, and I often watched them last year (1913). They used to breed regularly at Pelican Island some distance further south in Shark's Bay. They were common in the mangrove creeks in the vicinity of the North-west Cape and my natives informed me that they used to breed on a small island in the Exmouth Gulf. Some of these birds go a long way inland in order to fish in some of the permanent pools of such large rivers as the Gascoyne and Lyons."

Mr. J. P. Rogers' notes read: "A small flock was seen on the water one mile east of my camp at Marngle Creek. Several were seen on swamps near the Fitzroy when returning to Derby from Jegurrack, and one pair flew over Derby the day I left for Port Darwin. These birds are said to breed on the West Island of the Lacepede Group, North of Broome. I saw young birds at Broome in 1902 said to have been procured on this island in October. Are not numerous in West Kimberley.

"September 6, 1908. About twenty pelicans have arrived and taken up their quarters on Parry's Creek: these are the first I have seen. They are very quiet.

"September 7, 1908. Ten more arrived to-day.

AUSTRALIAN PELICAN.

“September 8. Pelicans again seen on Parry’s Creek. I frightened them, and about one hour afterwards saw them settled down on a plain about three-quarters of a mile from the nearest water.

“September 28, 1911. Melville Island. One of these birds was seen at Cooper’s Camp, the only one to date.”

INDEX.

NOTE.—The cyphers in THICK TYPE refer to the page where the genus or species is systematically treated. These are placed first.

- abbotti*, *Sula*, 215.
Abeltera, 201, 230.
adscensionis, *Diomedea*, 214, 216.
ægyptiaca, *Chenalopex*, 2.
æthereus, *Phæthon*, 292, 301, 302, 310.
 —, *Tropicophilus*, 292.
Aethya, 131.
 — *australis*, 134.
Aithya, 131.
Aithya, 131.
albipenis, *Nettapus coromandelianus*, 35.
albipennis, *Anserella*, 35.
 —, *Cheniscus coromandelianus*, 35, 34.
 —, *Nettapus*, 35.
 —, — *coromandelianus*, 35.
 —, — (*Anserella*), 35.
albiventer, *Carbo*, 171.
albiventris, *Graculus*, 171.
albus, *Phæthon*, 311.
 —, *Phæton*, 309.
aldabrensis, *Fregata minor*, 262, 267, 273, 276, 277, 279, 280.
Aluco flammea, 209.
aluco, *Strix*, 209.
americanus, *Graculus*, 171.
 —, *Phæthon*, 310.
 —, *Phalacrocorax carbo*, 171.
Anas, 84, 95, 114, 117.
 — *atrata*, 12.
 — *australis*, 134.
 — *badia*, 66.
 — *carunculata*, 143.
 — *castanea*, 97, 100, 107.
 — *cygnus niger*, 13.
 — *fasciata*, 124.
 — *gibberifrons*, 102, 107, 108.
 — *gracilis*, 107, 108, 112.
 — *iodotis*, 125.
 — *jubata*, 53.
 — *kasarkoides*, 78.
 — *leucophrys*, 91.
 — *lobata*, 143.
 — *malacorhyncha*, 125.
Anas melanoleuca, 25, 27, 28.
 — *membranacea*, 124.
 — *mülleri*, 91.
 — *nævosa*, 129.
 — *novæhollandiæ*, 86.
 — *platyrhynchos*, 84.
 — *plutonia*, 12.
 — *punctata*, 97, 102, 105.
 — *radjah*, 74, 76.
 — *rhynchotis*, 120.
 — *semipalmata*, 25, 26, 28, 64.
 — *subata*, 53.
 — *superciliosa*, 18, 70, 85, 90, 92, 100, 103, 104, 182.
 — — *pelewensis*, 90, 91.
 — — *rogersi*, 85, 86, 91, 92.
 — — *superciliosa*, 86, 91.
 — *tadornoides*, 78, 80.
 — *terræ-leeuwin*, 45.
 — *vagans*, 66.
 — (*Anseranas*) *melanoleuca*, 25.
 — (*Querquedula*) *humeralis*, 115.
 — (*Vinago*) *castanea*, 107.
Anassus, 84.
andrewsi, *Fregata*, 270, 274, 276, 277, 280, 287.
Anhinga, 193, 156, 177.
 — *anhinga*, 193.
 — *novæhollandiæ*, 195, 196.
anhinga, *Anhinga*, 193.
Anser, 1, 6, 43, 51.
 — *bassanus*, 24.
 — *griseus*, 45, 47.
 — *jubatus*, 53.
 — *lophotus*, 53.
 — *melanoleucus*, 25.
 — *novæhollandiæ*, 12.
 — *radjah*, 2, 6.
 — *semipalmatus*, 25.
 — (*Brenthus*) *jubatus*, 54.
Anseranas, 23, 5, 8, 61.
 — *melanoleuca*, 29.
 — *melanoleucus*, 25.
 — *semipalmata*, 25, 23, 26, 31.

THE BIRDS OF AUSTRALIA.

- Anseranas semipalmata hamiltoni*, 26.
 — *semipalmatus*, 26.
Anseranus, 23.
 — *melanoleucus*, 25.
Anserella, 32, 33.
 — *albipennis*, 35.
 — *pulchella*, 39.
aquila, *Attagen*, 240, 242.
 —, *Fregata*, 240, 241, 242, 246, 248, 249, 250, 251, 252, 253, 255, 256, 257, 259, 260, 261, 264, 268, 270, 271, 272, 273, 274, 276, 277, 280, 283.
 —, — *aquila*, 251.
 —, *Tachypetes*, 240, 242, 247, 248, 268.
aquilus, *Atagen*, 240, 246, 247.
 —, *Fregata*, 238.
 —, *Pelecanus*, 242, 243, 244, 245, 247, 254, 264, 271, 272.
 —, *Tachypetes*, 246.
arcuata, *Dendrocygna*, 62.
 —, *Dendrocygna*, 62, 64, 66, 69.
ariel, *Atagen*, 282.
 —, *Attagen*, 250.
 —, *Fregata*, 242, 243, 246, 249, 250, 252, 254, 257, 260, 261, 264, 267, 271, 272, 273, 274, 275, 276, 281, 282, 283, 284, 286, 287, 288.
 —, — *ariel*, 282, 239, 243, 276, 277, 286, 287.
 —, *Tachypetes*, 282.
Aristonetta, 2, 4, 5.
ascensionis, *Leptophætho lepturus*, 311.
Asio otus, 209.
asio, *Otus*, 209.
assimilis, *Malacorhynchus*, 124.
 —, — *membranaceus*, 125.
 —, *Puffinus*, 243.
Atagen, 236.
 — *aquilus*, 240, 246, 247.
 — *ariel*, 282.
 — *minor*, 282.
ater, *Carbo*, 174, 176.
 —, — *ater*, 175.
 —, *Mesocarbo*, 173.
 —, — *ater*, 174, 175.
Athya, 131.
atrata, *Anas*, 12.
 —, *Chenopsis*, 12, 10, 13, 18, 21.
 —, *Chenopsis*, 13, 47.
atratus, *Cygnus*, 12, 47.
Attagen, 236.
 — *aquila*, 240, 242.
 — *ariel*, 250.
auritus, *Phalacrocorax*, 170.
 Australian Brown Gannet (*Booby*), 231.
 — Gannet, 219.
 — Masked Gannet, 226.
 — Pelican, 314.
 — Red-legged Gannet, 210.
 Australian Shoveler, 120.
australis, *Anas*, 134.
 —, *Aethya*, 134.
 —, *Aythya*, 134.
 —, *Biziura*, 138.
 —, *Cereopsis*, 45.
 —, *Clangula (Oxyura)*, 138.
 —, *Dendrocygna arcuata*, 62, 66.
 —, — *javanica*, 62.
 —, *Erismatura*, 138.
 —, *Fulica*, 135.
 —, *Fuligula*, 134.
 —, *Ilyonetta*, 134.
 —, *Nyroca*, 133, 70, 87.
 —, — *nyroca*, 134.
 —, *Oxyura*, 138.
 —, — *australis*, 138.
 —, *Pelecanus*, 314, 316.
 —, *Sula*, 219, 223.
Aythia, 131.
Aythya, 131, 132.
 — *australis*, 134.
Aythya, 131.
badia, *Anas*, 66.
baeri, *Fuligula*, 134.
bassana, *Sula*, 201, 203, 204.
 —, *Sulita*, 217, 223.
bassanus, *Anser*, 214.
 —, *Dysporus*, 202.
 —, *Pelecanus*, 158, 200, 201, 202, 203, 204, 205.
bedouti, *Parasula dactylatra*, 226.
 —, *Sula dactylatra*, 200, 226, 229.
bergii, *Sterna*, 181.
Bernicla jubata, 53.
 — *melanoleuca*, 25.
 — *semipalmata*, 25.
bicolor, *Nettapus*, 35.
Biziura, 141, 8.
 — *australis*, 138.
 — *lobata*, 139, 140, 141, 143, 147, 149.
 — — *lobata*, 143, 144, 147.
 — — *menziesi*, 147.
 — — *westralis*, 144.
 — *novæhollandiæ*, 143.
 — *westralis*, 143, 146.
 Black Cormorant, 164.
 — Duck, 85.
 — Swan, 12.
 — and White Goose, 25.
 Blue-billed Duck, 138.
 Booby, 231.
Boschas, 84.
bougainvillii, *Hypoleucus*, 177.
branda, *Stictonetta*, 129.
Branta, 43.
 — *jubata*, 54.

INDEX.

Branta (*Chlamidochen*) *jubata*, 54.
brevirostris, *Phalacrocorax*, 191.
 —, *Scæophæthon rubricauda*, 303.
Bulweria, 237.

caledonicus, *Nycticorax*, 93.
californica, *Sula dactylatra*, 229.
candida, *Piscatrix*, 199, 200, 201, 202, 203, 205,
 206, 207, 209, 225, 230.
 —, *Sula*, 208, 215.
candidus, *Phæthon*, 309, 311.
 Cape Barren Goose, 44.
capensis, *Dysporus*, 204.
 —, *Sula*, 204.
 —, *Sulita*, 223.
capillatus, *Carbo*, 171.
 —, *Phalacrocorax*, 168.
Carbo, 161.
 — *albiventer*, 171.
 — *ater*, 174, 176.
 — *ater*, 175.
 — *sulcirostris*, 175.
 — *capillatus*, 171.
 — *carbo novæhollandiæ*, 165.
 — *steadii*, 170.
 — *westralis*, 165.
 — *dimidiatus*, 190, 192.
 — *filamentosus*, 171.
 — *fuscescens*, 180, 186.
 — *fuscescens*, 180.
 — *tunneyi*, 180.
 — *gouldi*, 179.
 — *tunneyi*, 180.
 — *hypoleucos*, 179, 184, 186, 187.
 — *leucocephala*, 171.
 — *melanoleucos*, 189.
 — *melanoleucos*, 190.
 — *melvillensis*, 190.
 — *melanoleucus*, 190.
 — *novæhollandiæ*, 164.
 — *raptensis*, 171.
 — *squamatus*, 175.
 — *sulcirostris*, 163, 174.
 — *sulcirostris*, 175.
 — *varius hypoleucos*, 184.
 — *perthi*, 184, 187.
carbo, *Phalacrocorax*, 161, 162, 164, 167, 168,
 169, 170, 172.
 —, — *carbo*, 171.
carboides, *Graculus*, 164.
 —, *Phalacrocorax*, 164, 165.
Carbonarius, 161.
caroliniana, *Fregata*, 246, 247.
Carpophaga, 93.
carunculata, *Anas*, 143.
Casarca, 77, 2, 6, 72, 73.
 — *castanea*, 97.
 — *ferruginea*, 77.

Casarca rutila, 2.
 — *tadernoides*, 79.
 — *tadornoides*, 78, 82, 83.
Casarka, 77.
 — *tadornoides*, 78.
castanea, *Anas*, 97, 100, 107.
 —, — (*Virago*), 107.
 —, *Casarca*, 97.
 —, *Mareca*, 6, 97, 105.
 —, *Virago*, 97, 95, 96, 98, 105, 106, 113.
 —, — *castanea*, 98.
castaneum, *Nettion*, 97, 99, 100, 102, 103, 104,
 108, 109, 110, 111, 112.
 —, *Nettion*, 98, 99.
catesbyi, *Leptophæthon*, 310.
 —, *Phæthon*, 309, 310.
Catoptropelicanus, 312, 313.
 — *conspicillatus*, 314, 312, 315.
 — *conspicillatus*, 315.
 — *westralis*, 315.
 — *perspicillatus*, 313, 315.
Cerconectes, 137.
Cereopsis, 42, 5, 8, 9, 43, 46, 61.
 — *australis*, 45.
 — *cinerea*, 45.
 — *cinereus*, 45.
 — *novæhollandiæ*, 44, 6, 42, 50.
 — *georgi*, 45, 50.
Cereopsis, New Holland, 44, 46.
chalconotus, *Graculus*, 176.
 —, *Phalacrocorax*, 176.
chalybeocephalus, *Monarcha chalybeocephalus*, 93.
 —, *Muscicapa*, 93.
chambeyroni, *Tachypetes*, 246, 259, 268, 273.
Chen, 43.
Chenalopex ægyptiaca, 2.
 — *lophotus*, 53.
Cheniscus, 32, 5, 33.
 — *coromandelianus*, 32.
 — *albipennis*, 35, 34.
 — *pulchellus*, 38, 34, 39.
Chenonetta, 51, 5, 6, 8, 52.
 — *jubata*, 53, 43, 51, 52, 54, 57, 82.
Chenopsis, 10, 4, 8.
 — *atrata*, 12, 10, 13, 18, 21.
 — *roberti*, 13.
Chenopsis, 10.
 — *atrata*, 13, 47.
Chlamidochen, 51.
Chlamydochen, 51.
Chlamydauchen, 51.
 — *jubatus*, 53.
Chlamydochen, 51.
 — *jubata*, 53.
 — *jubatus*, 54.
Chloëphaga, 52.
 — *jubata*, 54.
Chlæphaga, 5, 6.
Choristopus, 23.

THE BIRDS OF AUSTRALIA.

- Choristopus melanoleucus*, 26.
 — *semipalmatus*, 25.
cinerea, *Cereopsis*, 45.
cinereus, *Cereopsis*, 45.
circia, *Querquedula*, 115.
Circus gouldi, 148.
Clangula, 1
 — (*Oxyura*) *australis*, 138.
Clypeata, 117.
clypeata, *Spatula*, 117, 118, 119.
Cnemiornis, 43.
conspicillatus, *Catoptropelicanus*, 314, 312, 315.
 —, — *conspicillatus*, 315.
 —, *Pelecanus*, 314, 315, 316, 319, 320.
 —, — *conspicillatus*, 315.
 Cormorant, Black, 164.
 —, Little, 189.
 —, — Black, 174.
 —, Pied, 184.
 —, White-breasted, 179.
Cormoranus, 161.
cornix, *Corvus*, 92.
coromandelianus, *Cheniscus*, 32.
 —, *Nettapus*, 35.
coromandelicus, *Nettapus*, 35.
corone, *Corvus*, 92.
Corvus cornix, 92.
 — *corone*, 92.
Cosmonetta, 1.
cristatus, *Graculus*, 162.
 —, *Phalacrocorax*, 162.
 —, *Vanellus*, 185.
Ctenanas, 67, 61.
 — *eytoni*, 68.
Cyanochen, 5, 52.
cyanops, *Sula*, 200, 203, 226, 228, 233, 234, 235, 289.
Cyanopterus, 114.
Cygnus atratus, 12, 47.
 — *melanoleucus*, 26.
 — *plutonium*, 13.
Cyrtopelicanus, 313.
 — *trachyrhynchus*, 313.

dactylatra, *Parasula*, 225.
 —, *Sula*, 200, 203, 206, 226, 228.
 —, — *dactylatra*, 229.
dampieri, *Nyroca nyroca*, 134.
 Darter, 195.
 —, New Holland, 195.
Demigretta sacra, 92.
Dendrocygna, 2, 60.
 — *arcuata*, 62.
 — *eytoni*, 69.
 — *vagans*, 62.
Dendrocygna, 60, 6, 61, 67.
 — *arcuata*, 62, 64, 66, 69.
 — — (*australis*), 62, 66.

Dendrocygna arcuata gouldi, 62, 66.
 — *eytoni*, 64, 68, 70, 87.
 — — *munna*, 69.
 — *gouldi*, 62, 66.
 — *javanica*, 60, 66.
 — — *australis*, 62.
 — — *gouldi*, 62.
 — — *peroni*, 63.
 — *vagans*, 62, 65.
 — *versicolor*, 68.
 — (*Leptotarsis*), *eytoni*, 69.
 — (*Leptotarsus*), *eytoni*, 69.
Dendronessa, 60.
derbyi, *Plotus novæhollandiæ*, 196.
dimidiatus, *Carbo*, 190, 192.
Diomedea adscensionis, 214, 216.
 — *piscatoria*, 213, 214, 215.
Disporus, 230.
dorotheæ, *Leptophæthon*, 306.
 —, — *lepturus*, 307, 311.
 —, *Phæthon*, 307.
 —, — *lepturus*, 292, 307.
 —, *Phæthon lepturus*, 307.
 Duck, Black, 85.
 —, Blue-billed, 138.
 —, Eastern Musk, 147.
 —, Freckled, 129.
 —, Hawksbury, 53.
 —, Lobated, 143.
 —, Membranaceous, 124.
 —, Mountain, 78.
 —, New Holland, 124.
 —, Pink-eared, 124.
 —, Plumed Whistling, 68.
 —, Western Musk, 143.
 —, Whistling, 62.
 —, White-eyed, 133.
 —, Wood-, or Maned Goose, 53.
dyotti, *Morus serrator*, 219.
 —, *Sula serrator*, 219.
 —, *Sulita serrator*, 219, 204, 223.
Dysporus, 201, 202, 203, 204, 230.
 — *bassanus*, 202.
 — *capensis*, 204.
 — *sula*, 231.

 Eastern Garganey Teal, 115.
 — Lesser Frigate Bird, 282.
 — Musk Duck, 147.
 — Shoveler, 118.
Ecmeles, 161.
edwardsi, *Lepturus*, 292.
 —, *Phæthon*, 309, 310, 311.
Erimistura, 136.
Erismatura, 136, 8, 137.
 — *australis*, 138.
erubescens, *Phæthon*, 295, 298, 299.
 —, — *rubricauda*, 295, 300, 301, 302, 303.

INDEX.

- eytoni*, *Ctenanas*, 68.
 —, *Dendrocycna*, 69.
 —, *Dendrocycna*, 64, 68, 70, 87.
 —, — (Leptotarsis), 69.
 —, — (Leptotarsus), 69.
 —, *Leptotarsis*, 2, 67, 68, 70.
 —, *Radja*, 74.
 —, *Radjah*, 74, 76.
- fasciata*, *Anas*, 124.
fasciatus, *Malacorhynchus*, 125.
ferruginea, *Casarca*, 77.
fiber, *Sula*, 216, 231, 234, 235.
filamentosus, *Carbo*, 171.
 —, *Phalacrocorax*, 167, 168, 169, 171.
finschii, *Phalacrocorax*, 191.
flammea, *Aluco*, 209.
flavirhynchus, *Phalacrocorax*, 190, 192.
flavirostris, *Graucalus*, 190.
 —, *Lepturus*, 292.
 —, *Phæthon*, 309, 311.
flavo-aurantius, *Phæthon*, 310.
flindersi, *Radjah radjah*, 75.
 Freckled Duck, 129.
Fregata, 236, 154, 155, 156, 159, 237, 238, 292, 293.
 — *andrewsi*, 270, 274, 276, 277, 280, 287.
 — *aquila*, 240, 241, 242, 246, 248, 249, 250, 251, 252, 253, 255, 256, 257, 259, 260, 261, 264, 268, 270, 271, 272, 273, 274, 275, 276, 277, 280, 283.
 — — *aquila*, 251.
 — — *minor*, 249, 250, 251, 268, 273.
 — — *palmerstoni*, 240, 243, 259, 260.
 — *aquilus*, 238.
 — *ariel*, 242, 243, 246, 249, 250, 252, 254, 257, 260, 261, 264, 267, 271, 272, 273, 274, 275, 276, 281, 282, 283, 284, 286, 287, 288.
 — — *ariel*, 282, 239, 243, 276, 277, 286, 287.
 — — *iredalei*, 275, 276, 277, 287.
 — — *tunnyi*, 288, 239, 274, 276, 287, 290.
 — *caroliniana*, 246, 247.
 — *magnificens*, 275, 276, 277, 279, 280.
 — *minor*, 236, 238, 245, 246, 249, 251, 256, 258, 259, 262, 264, 269, 270, 271, 272, 273, 274, 275, 281, 282, 286, 287.
 — — *aldabrensis*, 262, 267, 273, 276, 277, 279, 280.
 — — *listeri*, 240, 239, 241, 267, 271, 273, 280, 281.
 — — *magnificens*, 269, 274.
 — — *minor*, 265, 276, 277, 280.
 — — *nicolli*, 265, 273, 276, 277, 280.
 — — *palmerstoni*, 268, 273, 277, 280, 281.
 — — *ridgwayi*, 269, 274, 276, 277, 280.
 — — *rothschildi*, 280, 281.
 — — *strumosa*, 268, 273.
- Fregata palmerstoni*, 240.
 — *strumosa*, 243, 246, 268.
Fregatta, 236.
 Frigate Bird, Eastern Lesser, 282.
 — —, Greater, 240.
 — —, Western Lesser, 288.
Fulica australis, 135.
Fuligula, 2, 4.
 — *australis*, 134.
 — *baeri*, 134.
fulvus, *Leptophæthon*, 308, 310.
fusca, *Sula*, 202, 231.
fuscescens, *Carbo*, 180, 186.
 —, — *fuscescens*, 180.
 —, *Hydrocorax*, 179, 182.
 —, *Hypoleucus*, 179, 178, 180.
fuscus, *Leptopelicanus*, 313.
- gaimardi*, *Stictocarbo*, 162, 163, 177.
 Gannet, Australian, 219.
 —, — Brown (Booby), 231.
 —, — Masked, 226.
 —, — Red-legged, 210.
Gennæochen, 72.
 — *radjah*, 74.
georgi, *Cereopsis novæhollandiæ*, 45, 50.
gesneri, *Onocrotalus*, 313.
gibberifrons, *Anas*, 102, 107, 108.
 —, *Nettion*, 87, 100, 102, 105, 108, 109, 110, 112.
 —, *Nettion*, 102.
 —, *Virago*, 95, 100, 102, 106.
 Goose, Black and White, 25.
 —, Cape Barren, 44.
 —, Maned, or Wood-Duck, 53.
 —, Pied, 25.
 —, Semipalmated, 25.
 —, Teal, Green, 38.
 —, —, White-quilled, 35.
gouldi, *Carbo*, 179.
 —, *Circus*, 148.
 —, *Dendrocycna*, 62, 66.
 —, — *arcuata*, 62, 66.
 —, — *javanica*, 62.
 —, *Hypoleucus*, 179.
 —, — *varius*, 185.
 —, *Phalacrocorax*, 179, 181, 182, 183, 187.
gracemeri, *Phalacrocorax carbo*, 167.
gracilis, *Anas*, 107, 108, 112.
Graculus, 161, 162, 163.
 — *albiventris*, 171.
 — *americanus*, 171.
 — *carboides*, 164.
 — *chalconotus*, 176.
 — *cristatus*, 162.
 — *leucogaster*, 179.
 — *melanoleucus*, 190.
 — *novæhollandiæ*, 164.

THE BIRDS OF AUSTRALIA.

- Graculus stictocephalus*, 174.
 — *sulcirostris*, 174.
 — *varius*, 184.
granti, *Sula dactylatra*, 229.
Graucalus, 161.
 — *flavirostris*, 190.
 Greater Frigate Bird, 240.
 Green Goose-Teal, 38.
 — -headed Teal, 97, 113.
 Grey or Slender Teal, 102, 113.
griseus, *Anser*, 45, 47.
Gulosus, 162.
Gymnura, 136.
- Haliæus*, 163, 188.
 — *leucomelas*, 190.
 — *melanoleucus*, 190.
 — *stictocephalus*, 174.
Haliætor, 188.
Haliæus, 161, 162, 188.
 — *pygmæus*, 162.
hamiltoni, *Anseranas semipalmata*, 26.
 Hawksbury Duck, 53.
Helieus, 188.
Hemisula, 159, 200, 206, 209, 230.
 — *leucogaster plotus*, 231.
 — — *rogersi*, 231.
Histrionicus, 1.
humeralis, *Anas* (*Querquedula*), 115.
 —, *Querquedula querquedula*, 115.
Hydrobates, 141.
 — *lobatus*, 143.
Hydrocorax, 161.
 — *fuscescens*, 179, 182.
 — *melanoleucos*, 189, 192.
Hydrobates, 141.
 — *lobatus*, 143.
hypoleucos, *Carbo*, 179, 184, 186, 187.
 —, — *varius*, 184.
Hypoleucus, 177, 157, 162, 163, 173.
 — *bougainvillii*, 177.
 — *fuscescens*, 179, 178, 180.
 — *gouldi*, 179.
 — *leucogaster*, 179.
 — *varius*, 162, 177, 184.
 — — *gouldi*, 185.
 — — *hypoleucus*, 184.
 — — *perthi*, 184, 178.
 — — *whitei*, 187.
hypoleucus, *Hypoleucus varius*, 184.
 —, *Phalacrocorax*, 177, 182, 183, 184.
- Ilyonetta*, 131.
 — *australis*, 134.
indiana, *Spatula clypeata*, 118.
indicus, *Phalacrocorax carbo*, 171.
iodotis, *Anas*, 125.
- iodotis*, *Malacorhynchus*, 145.
iredalei, *Fregata ariel*, 275, 276, 277, 287.
- jamaicensis*, *Oxyura*, 136.
javanica, *Dendrocygna*, 60, 66.
javanicus, *Microcarbo*, 157.
jubata, *Anas*, 53.
 —, *Bernicla*, 53.
 —, *Branta*, 54.
 —, — (*Chlamidochen*), 54.
 —, *Chenonetta*, 53, 43, 51, 52, 54, 57, 82.
 —, *Chlamydochen*, 53.
 —, *Chloephaga*, 54.
jubatus, *Anser*, 53.
 —, — (*Brenthus*), 54.
 —, *Chlamydauchen*, 53.
 —, *Chlamydochen*, 54.
Jula, 230.
- kasarkoides*, *Anas*, 78.
- Larus novæhollandiæ*, 182.
Leptopelicanus, 313.
 — *fuscus*, 313.
Leptophæthon, 306, 159, 292.
 — *catesbyi*, 310.
 — *dorotheæ*, 306.
 — *fulvus*, 308, 310.
 — *lepturus*, 306, 308, 311.
 — — *ascensionis*, 311.
 — — *dorotheæ*, 307, 311.
 — — *lepturus*, 311.
Leptotarsis, 2, 61, 67.
 — *sp.*, 69.
 — *eytoni*, 2, 67, 68, 70.
Leptotarsus, 67.
Lepturus, 292, 306.
 — *edwardsi*, 292.
 — *flavirostris*, 292.
lepturus, *Leptophæthon*, 306, 308, 311.
 —, — *lepturus*, 311.
 —, *Phæthon*, 307, 310.
 —, — *lepturus*, 307.
 —, *Phæton*, 307, 309.
lesueuri, *Stictonetta nævosa*, 129.
Leucocarbo, 163, 177.
leucocephala, *Carbo*, 171.
leucocephalos, *Pelecanus*, 245, 247, 264.
leucogaster, *Graculus*, 179.
 —, *Hypoleucus*, 179.
 —, *Pelecanus*, 200, 201, 202, 203, 206, 207,
 208, 209, 215, 216.
 —, *Phalacrocorax*, 179, 182, 186.
 —, *Sula*, 209, 215, 230, 231, 232, 233.
 —, — *leucogaster*, 231.
leucogastra, *Sula*, 203, 208, 231.

INDEX.

- leucomelas*, *Halicæus*, 190.
leucophrys, *Anas*, 91.
leucotis, *Phalacrocorax*, 171.
levaillantii, *Plotus*, 194.
listeri, *Fregata minor*, 240, 239, 241, 267, 271, 273, 280, 281.
 Little Black Cormorant, 174.
 ——— Cormorant, 189.
lobata, *Anas*, 143.
 ———, *Biziura*, 139, 140, 141, 143, 147, 149.
 ———, ——— *lobata*, 143, 144, 147.
 Lobated Duck, 143.
lobatus, *Hydrobates*, 143.
 ———, *Hydrobates*, 143.
 ———, *Oidemia* (*Hydrobates*), 144.
lophotus, *Anser*, 53.
 ———, *Chenalopex*, 53.
 ———, *Sarkidiornis* (*Chenonetta*), 53.
- macrorhynchus*, *Phalacrocorax carbo*, 171.
maculatus, *Rynchaspis*, 120.
magnificens, *Fregata*, 275, 276, 277, 279, 280.
 ———, ——— *minor*, 269, 274.
maior, *Plancus*, 202.
malacorrhyncha, *Anas*, 125.
Malacorrhynchus, 123.
Malacorrhynchus, 123, 7.
 ——— *assimilis*, 124.
 ——— *fasciatus*, 125.
 ——— *iodotis*, 145.
 ——— *malacorrhynchus*, 125.
 ——— *membranaceus*, 124, 64, 123.
 ——— ——— *assimilis*, 125.
 ——— ——— *membranaceus*, 125.
 ——— *membrinacea*, 125.
malacorrhynchus, *Malacorrhynchus*, 125.
Malacorrhynchus, 123.
 ——— *membranaceus*, 125.
 Maned Goose or Wood-Duck, 53.
Mareca castanea, 6, 97, 105.
 ——— *punctata*, 97.
Marila, 4.
Melanocarbo, 188.
melanogaster, *Plotus*, 196.
melanoleuca, *Anas*, 25, 27, 28.
 ———, ——— (*Anseranas*), 25.
 ———, *Anseranas*, 29.
 ———, *Bernicla*, 25.
melanoleucos, *Carbo*, 189.
 ———, ——— *melanoleucos*, 190.
 ———, *Hydrocorax*, 189, 192.
melanoleucus, *Anser*, 53.
 ———, *Anseranas*, 25.
 ———, *Anseranus*, 25.
 ———, *Carbo*, 190.
 ———, *Choristopus*, 26.
 ———, *Cygnus*, 26.
 ———, *Graculus*, 190.
- melanoleucus*, *Halicæus*, 190.
 ———, *Microcarbo*, 188, 190.
 ———, ——— *melanoleucus*, 189.
 ———, *Phalacrocorax*, 163, 189, 191.
melanonotus, *Porphyrio*, 149.
melanops, *Sula dactylatra*, 229.
melanorhynchus, *Phæton*, 300, 301, 302.
melanorhynchus, *Scæophæthon rubricauda*, 303.
melvillensis, *Carbo melanoleucos*, 190.
membranacea, *Anas*, 124.
 ———, *Rhynchaspis*, 124.
 Membranaceous Duck, 124.
membranaceus, *Malacorrhynchus*, 124, 64, 123, 125.
 ———, ——— *membranaceus*, 125.
membrinacea, *Malacorrhynchus*, 125.
menziesi, *Biziura lobata*, 147.
Mesocarbo, 173, 157.
 ——— *ater*, 173.
 ——— ——— *ater*, 174, 175.
 ——— ——— *territori*, 176.
Microcarbo, 188, 157, 163, 173.
 ——— *javanicus*, 157.
 ——— *melanoleucus*, 188, 190.
 ——— ——— *melanoleucus*, 189.
 ——— *pygmæus*, 157, 188.
 ——— *stictocephalus*, 174.
 ——— *sulcirostris*, 175.
Microcygna, 32, 33.
minor, *Atagen*, 282.
 ———, *Fregata*, 236, 238, 245, 246, 249, 251, 256, 258, 259, 262, 264, 269, 270, 271, 272, 273, 274, 275, 281, 282, 286, 287.
 ———, ——— *aquila*, 249, 250, 251, 268, 273.
 ———, ——— *minor*, 265, 276, 277, 280.
 ———, *Pelecanus*, 245, 246, 247, 250, 251, 254, 263, 264, 271, 272, 277.
 ———, *Tachypetes*, 242, 282, 288.
Monarcha chalybeocephalus chalybeocephalus, 93.
Moris, 201, 217, 218.
Morum, 217, 218.
Morus, 200, 201, 202, 217, 218.
 ——— *serrator dyotti*, 219.
morus, *Plancus*, 218.
 Mountain Duck, 78.
mülleri, *Anas*, 91.
munna, *Dendrocygna eytoni*, 69.
Muscicapa chalybeocephalus, 93.
- nævosa*, *Anas*, 129.
 ———, *Stictonetta*, 129, 128.
 ———, ——— *nævosa*, 129.
 ———, *Tadorna*, 129.
Nettalopex, 77.
 ——— *tadornina*, 79.
Nettapus albipennis, 35.
 ——— *auritus*, 5, 33.
 ——— *bicolor*, 35.

THE BIRDS OF AUSTRALIA.

- Nettapus coromandelianus*, 35.
 ——— *albipennis*, 35.
 ——— *albipennis*, 35.
 ——— *coromandelicus*, 35.
 ——— *pulchellus*, 36, 38.
 ——— (*Anserella*) *albipennis*, 35.
 ——— (——) *pulchellus*, 38.
Nettion, 3, 4, 6, 95, 114.
 ——— *castaneum*, 97, 99, 100, 102, 103, 104, 108, 109, 110, 111, 112.
 ——— *rogersi*, 102.
 ——— *gibberifrons*, 87, 100, 102, 105, 108, 109, 110, 112.
 ——— *rogersi*, 102.
Nettion castaneum, 98, 99.
 ——— *gibberifrons*, 102.
Nettopus pulchellus, 38, 41.
 New Holland Cereopsis, 44, 46.
 ——— Darter, 195.
 ——— Duck, 124.
 ——— Pelican, 314, 316.
 ——— Shag, 164.
 ——— Sheldrake, 78.
 ——— Shoveler, 120.
 ——— Tropic Bird, 295, 299, 300.
nicolli, *Fregata minor*, 265, 273, 276, 277, 280.
niger, *Anas cygnus*, 13.
Notophox novæhollandiæ, 55.
novæhollandiæ, *Anas*, 86.
 ———, *Anhinga*, 195, 196.
 ———, *Plotus*, 195.
 ———, ——— *novæhollandiæ*, 196.
 ———, *Anser*, 12.
 ———, *Biziura*, 143.
 ———, *Carbo*, 164.
 ———, ——— *carbo*, 165.
 ———, *Cereopsis*, 44, 6, 42, 50.
 ———, *Graculus*, 164.
 ———, *Larus*, 182.
 ———, *Notophox*, 55.
 ———, *Phæthon*, 295, 299, 300, 301, 302.
 ———, ——— *rubricaudus*, 296, 302.
 ———, *Phalacrocorax*, 164, 165.
 ———, ——— *carbo*, 164, 165, 172.
 ———, *Sceophæthon rubricauda*, 295, 294, 303, 304.
Nycticorax caledonicus, 93.
Nyroca, 131, 2, 48, 132.
 ——— *australis*, 133, 70, 87.
 ——— *nyroca*, 131.
 ——— ——— *australis*, 134.
 ——— ——— *dampieri*, 134.
nyroca, *Nyroca*, 131.

Œdemia, 3, 4.
Oidemia, 4.
 ——— (*Hydrobates*) *lobatus*, 144.
Onocrotalus, 160, 313.

Onocrotalus gesneri, 313.
onocrotalus, *Pelecanus*, 245.
Otus asio, 209.
otus, *Asio*, 209.
Oxyura, 8, 136.
 ——— *australis*, 138.
 ——— ——— *australis*, 138.
 ——— ——— *victoriæ*, 138.
 ——— *jamaicensis*, 136.
Oxyurus, 136.

 Palmerston Frigate Pelican, 245.
palmerstoni, *Fregata*, 240.
 ———, ——— *aquila*, 240, 243, 259, 260.
 ———, ——— *minor*, 268, 273, 277, 280, 281.
 ———, *Pelecanus*, 243, 245, 246, 247, 259, 273, 302.
 ———, *Tachypetes*, 248, 268.
Parasula, 225, 158, 200, 207.
 ———, *dactylatra*, 225.
 ——— ——— *bedouti*, 226.
 ——— ——— *personata*, 226.
parvus, *Pelecanus*, 203.
Pelecanus, 155, 156, 160, 202, 312.
 ——— *aquilus*, 242, 243, 244, 245, 247, 254, 264, 271, 272.
 ——— *australis*, 314, 316.
 ——— *bassanus*, 158, 200, 201, 202, 203, 204, 205.
 ——— *conspicillatus*, 314, 315, 316, 319, 320.
 ——— ——— *conspicillatus*, 315.
 ——— ——— *westralis*, 315.
 ——— *leucocephalos*, 245, 247, 264.
 ——— *leucogaster*, 200, 201, 202, 203, 206, 207, 208, 209, 215, 216.
 ——— *minor*, 245, 246, 247, 250, 251, 254, 263, 264, 271, 272, 277.
 ——— *onocrotalus*, 245.
 ——— *palmerstoni*, 243, 245, 246, 247, 259, 273, 302.
 ——— *parvus*, 203.
 ——— *piscator*, 200, 203, 204, 207, 208, 209, 212, 213, 214, 215, 216.
 ——— *plotus*, 231.
 ——— *serrator*, 158.
 ——— *sinensis*, 168.
 ——— *sula*, 157, 203, 204, 205, 208, 209, 215, 216, 224.
pelewensis, *Anas superciliosa*, 90, 91.
 Pelican, Australian, 314.
 ———, New Holland, 314, 316.
 ———, Palmerston Frigate, 245.
 ———, White-headed Frigate, 245.
peroni, *Dendrocygna javanica*, 63.
personata, *Parasula dactylatra*, 226.
 ———, *Sula*, 226, 228.
 ———, ——— *dactylatra*, 226, 229.
perspicillatus, *Catoptropelicanus*, 313, 315.
perthi, *Carbo varius*, 184, 187.

INDEX.

- perthi*, *Hypoleucus varius*, 184, 178.
Phæthon, 154, 155, 156, 159, 168, 237, 238, 291, 292, 293.
 — *æthereus*, 292, 301, 302, 310.
 — *albus*, 311.
 — *americanus*, 310.
 — *candidus*, 309, 311.
 — *catesbyi*, 309, 310.
 — *dorotheæ*, 307.
 — *edwardsii*, 309, 310, 311.
 — *erubescens*, 295, 298, 299.
 — *flavirostris*, 309, 311.
 — *flavo-aurantius*, 310.
 — *lepturus*, 307, 310.
 — — *dorotheæ*, 292, 307.
 — — *lepturus*, 307.
 — *novæhollandiæ*, 295, 299, 300, 301, 302.
 — *phænicurus*, 292, 295, 298.
 — *rubricauda*, 295, 298, 299, 301, 302, 304.
 — — *erubescens*, 295, 300, 301, 302, 303.
 — — *rubricauda*, 302, 303.
 — — *westralis*, 292, 302, 304.
 — *rubricaudus novæhollandiæ*, 296, 302.
 — — *rubricaudus*, 304.
 — *westralis*, 304.
Phæton albus, 309.
 — *lepturus*, 307, 309.
 — — *dorotheæ*, 307.
 — *melanorhynchus*, 300, 301, 302.
 — *phænicurus*, 295.
 — *rubricauda*, 295, 298, 300, 302, 304.
Phalacrocorax, 161, 155, 156, 157, 162, 173, 177, 238, 293.
 — *auritus*, 170.
 — *brevirostris*, 191.
 — *capillatus*, 168.
 — *carbo*, 161, 162, 164, 167, 168, 169, 170, 172.
 — — *americanus*, 171.
 — — *carbo*, 171.
 — — *gracemeri*, 167.
 — — *indicus*, 171.
 — — *macrorhynchus*, 171.
 — — *novæhollandiæ*, 164, 165, 172.
 — — *sinensis*, 171.
 — — *steadii*, 172.
 — *carboides*, 164, 165.
 — *chalconotus*, 176.
 — *cristatus*, 162.
 — *filamentosus*, 167, 168, 169, 171.
 — *finschii*, 191.
 — *flavirhynchus*, 190, 192.
 — *gouldi*, 179, 181, 182, 183, 187.
 — *hypoleucus*, 177, 182, 183, 184.
 — *leucogaster*, 179, 182, 186.
 — *leucotis*, 171.
 — *melanoleucus*, 163, 189, 191.
 — *novæhollandiæ*, 164, 165.
 — *pygmæus*, 162, 163.
 — *stewarti*, 176.
Phalacrocorax stictocephalus, 175.
 — *sulcirostris*, 174.
 — *urile*, 163.
 — *varius*, 162, 182, 183, 184, 186, 187.
Phænicurus, 291, 292.
 — *phænicurus*, 292.
 — *rubricauda*, 295.
phænicurus, *Phæthon*, 292, 295, 298.
 — *Phæton*, 295.
 — *Phænicurus*, 292.
Pied Cormorant, 184.
 — Goose, 25.
Pink-eared Duck, 124.
piscator, *Pelecanus*, 200, 203, 204, 207, 208, 209, 212, 213, 214, 215, 216.
 — *Sula*, 203, 208, 209, 210, 212, 213.
 — — *piscator*, 210.
piscatoria, *Diomedea*, 213, 214, 215.
Piscatrix, 199, 200, 201, 202, 203, 205, 206, 207, 209, 225, 230.
 — *candida*, 201, 202, 203, 210.
 — *sula*, 199, 204, 209, 210.
 — — *rubripes*, 210, 204.
piscatrix, *Sula*, 210, 211, 215, 233.
Plancus, 201, 202, 203, 217.
 — *maior*, 202.
 — *morus*, 218.
platyrhynchus, *Anas*, 84.
Plaucus, 201, 217.
Plectrura, 136.
Plotus, 193.
Plotus, 155, 157, 193, 198.
 — *levaillantii*, 194.
 — *melanogaster*, 196.
 — *novæhollandiæ*, 195.
 — — *derbyi*, 196.
 — — *novæhollandiæ*, 196.
 — *rufus*, 194.
plotus, *Hemisula leucogaster*, 231.
 — *Pelecanus*, 231.
 — *Sula leucogaster*, 231.
Plumed Whistling Duck, 68.
plutonia, *Anas*, 12.
plutonium, *Cygnus*, 13.
Porphyrio melanonotus, 149.
Pseudacanthus, 153.
Pterocyanea, 114.
Puffinus assimilis, 243.
pulchella, *Anserella*, 39.
pulchellus, *Cheniscus*, 38, 34, 39.
 — *Nettapus*, 36, 38.
 — — (*Anserella*), 38.
 — *Nettopus*, 38, 41.
punctata, *Anas*, 97, 102, 105.
 — *Mareca*, 97.
 — *Querquedula*, 97.
punctatus, *Stictocarbo*, 162, 163, 177.
pygmæus, *Halieus*, 162.
 — *Microcarbo*, 157, 188.

THE BIRDS OF AUSTRALIA.

- pygmæus*, *Phalacrocorax*, 162, 163.
- Querquedula*, 114, 3, 4, 6, 7, 95.
 — *circia*, 115.
 — *punctata*, 97.
 — *querquedula*, 114, 115.
 — — *humeralis*, 115.
querquedula, *Querquedula*, 114, 115.
Quesquedula, 114.
- Radja*, 72.
 — *eytoni*, 74.
Radjah, 72, 2, 6, 73, 77.
 — *eytoni*, 74, 76.
 — *radjah*, 72, 76.
 — — *flindersi*, 75.
 — — *rufitergum*, 74, 75, 76.
radjah, *Anas*, 74, 76.
 —, *Anser*, 2, 6.
 —, *Gennæochen*, 74.
 —, *Radjah*, 72, 76.
 —, *Tadorna*, 74, 75.
raptensis, *Carbo*, 171.
Rhinaspis, 117.
Rhynchasmus, 117.
Rhynchaspis, 117.
 — *membranacea*, 124.
rhynchotis, *Anas*, 120.
 —, *Rynchaspis*, 120.
 —, *Spatula*, 120.
 —, — *rhynchotis*, 120, 121.
ridgwayi, *Fregata minor*, 269, 274, 276, 277, 280.
roberti, *Chenopsis atrata*, 13.
rogersi, *Anas superciliosa*, 85, 86, 91, 92.
 —, *Hemisula leucogaster*, 231.
 —, *Nettion*, 102.
 —, — *castaneum*, 102.
 —, *Sula leucogaster*, 200, 231.
 —, *Virago castanea*, 102.
 —, — *gibberifrons*, 102, 96, 98, 101, 112, 113.
rothschildi, *Fregata minor*, 280, 281.
 —, *Scæophæthon rubricauda*, 303.
rubricauda, *Phæthon*, 295, 298, 299, 301, 302, 304.
 —, — *rubricauda*, 302, 303.
 —, *Phæton*, 295, 298, 300, 302, 304.
 —, *Phænicurus*, 295.
 —, *Scæophæthon*, 291.
rubricaudus, *Phæthon rubricaudus*, 304.
rubripes, *Piscatrix sula*, 210, 204.
 —, *Sula*, 210, 211.
 —, — *piscator*, 210.
 Ruddy Tropic Bird, 295.
rufitergum, *Radjah*, 74, 75, 76.
 —, *Tadorna*, 74.
 —, — *radjah*, 74, 76.
- rufus*, *Plotus*, 194.
rutila, *Casarca*, 2.
Rynchaspis, 117.
 — *maculatus*, 120.
 — *rhynchotis*, 120.
- sacra*, *Demigretta*, 92.
Sarkidiornis (*Chenonetta*) *lophotus*, 53.
Scæophæthon, 291, 159, 292, 306.
 — *rubricauda*, 291.
 — — *brevirostris*, 303.
 — — *melanorhynchus*, 303.
 — — *novæhollandiæ*, 295, 294, 303, 304.
 — — *rothschildi*, 303.
 — — *westralis*, 304, 294, 303.
 — *westralis*, 291.
semipalmata, *Anas*, 25, 26, 28, 64.
 —, *Anseranas*, 25, 23, 26, 31.
 —, *Bernicla*, 25.
 Semipalmated Goose, 25.
semipalmatus, *Anser*, 25.
 —, *Anseranas*, 26.
 —, *Choristopus*, 25.
serrator, *Pelecanus*, 158.
 —, *Sula*, 204, 219.
 —, — *bassana*, 219.
 —, — *serrator*, 219.
 —, *Sulita serrator*, 223.
 Shag, New Holland, 164.
 Sheldrake, New Holland, 78.
 Shoveler, Australian, 120.
 —, Eastern, 118.
 —, New Holland, 120.
sinensis, *Pelecanus*, 168.
 —, *Phalacrocorax carbo*, 171.
 Slender or Grey Teal, 102, 113.
Souchets, 117.
Spathulea, 117.
Spatula, 117, 1, 7.
 — *clypeata*, 117, 118, 119.
 — — *indiana*, 118.
 — *rhynchotis*, 120.
 — — *rhynchotis*, 120, 121.
 — *variegata*, 121.
Spatulea, 117.
squamatus, *Carbo*, 175.
steadi, *Carbo carbo*, 170.
 —, *Phalacrocorax carbo*, 172.
Sterna bergii, 181.
stewarti, *Phalacrocorax*, 176.
Stictocarbo, 162, 163, 177.
 — *gaimardi*, 162, 163, 177.
 — *punctatus*, 162, 163, 177.
stictocephalus, *Graculus*, 174.
 —, *Haliceus*, 174.
 —, *Microcarbo*, 174.
 —, *Phalacrocorax*, 175.
Stictonetta, 128, 7, 8.

INDEX.

- Stictonetta branda*, 129.
 — *nævosa*, 129, 128.
 — — *lesueuri*, 129.
 — — *nævosa*, 129.
Strix aluco, 209.
strumosa, *Fregata*, 243, 246, 268.
 —, — *minor*, 268, 273.
subata, *Anas*, 53.
Suca, 230.
Sula, 230, 153, 156, 157, 159, 200, 201, 202, 203, 206, 207, 208, 209, 215, 225, 238, 293.
 — *abbotti*, 215.
 — *australis*, 219, 223.
 — *bassana*, 201, 203, 204.
 — — *serrator*, 219.
 — *candida*, 208, 215.
 — *capensis*, 204.
 — *cyanops*, 200, 203, 226, 228, 233, 234, 235, 289.
 — *dactylatra*, 200, 203, 206, 226, 228.
 — — *bedouti*, 200, 226, 229.
 — — *californica*, 229.
 — — *dactylatra*, 229.
 — — *granti*, 229.
 — — *melanops*, 229.
 — — *personata*, 226, 229.
 — *fiber*, 216, 231, 234, 235.
 — *fusca*, 202, 231.
 — *leucogaster*, 209, 215, 230, 231, 232, 233.
 — — *leucogaster*, 231.
 — — *plotus*, 231.
 — — *rogersi*, 200, 231.
 — *leucogastra*, 203, 208, 231.
 — *personata*, 226, 228.
 — *piscator*, 203, 208, 209, 210, 212, 213.
 — — *piscator*, 210.
 — — *rubripes*, 210.
 — *piscatrix*, 210, 211, 215, 233.
 — *rubripes*, 210, 211.
 — *serrator*, 204, 219.
 — — *dyotti*, 219.
 — — *serrator*, 219.
 — *sula*, 201, 203, 207, 208, 215, 219, 221, 231.
sula, *Dysporus*, 231.
 —, *Pelecanus*, 157, 203, 204, 205, 208, 209, 215, 216, 224.
 — *Piscatrix*, 199, 204, 209, 210.
 —, *Sula*, 201, 203, 207, 208, 215, 219, 221, 231.
Sularius, 201, 202, 230.
sulcirostris, *Carbo*, 163, 174.
 —, — *ater*, 175.
 —, — *sulcirostris*, 175.
 —, *Graculus*, 174.
 —, *Microcarbo*, 175.
 —, *Phalacrocorax*, 174.
Sulita, 217, 158, 204, 205, 206, 207, 225.
 — *bassana*, 217, 223.
 — *capensis*, 223.
Sulita serrator dyotti, 219, 204, 223.
 — — *serrator*, 223.
superciliosa, *Anas*, 18, 70, 85, 90, 92, 100, 103, 104, 182.
 —, — *superciliosa*, 86, 91.
 Swan, Black, 12.
Tachypetes, 236.
 — *aquila*, 240, 242, 247, 248, 268.
 — *aquilus*, 246.
 — *ariel*, 282.
 — *chambeyroni*, 246, 259, 268, 273.
 — *minor*, 242, 282, 288.
 — *palmerstoni*, 248, 268.
Tachypletis, 236.
tadernoides, *Casarca*, 79.
Tadorna, 6, 72, 73, 77.
 — *nævosa*, 129.
 — *radjah*, 74, 75.
 — — *rufitergum*, 74, 76.
 — *rufitergum*, 74.
 — *tadornoides*, 78.
 — — *westralis*, 79.
tadornina, *Nettalopex*, 79.
tadornoides, *Anas*, 78, 80.
 —, *Casarca*, 78, 82, 83.
 —, *Casarka*, 78.
 —, *Tadorna*, 78.
 —, *Vulpanser*, 79.
 Teal, Eastern Garganey, 115.
 —, Green Goose, 38.
 —, — -headed, 97, 113.
 —, Grey or Slender, 102, 113.
 —, Slender or Grey, 102, 113.
 —, White-quilled Goose, 35.
terræ-leeuwin, *Anas*, 45.
territori, *Mesocarbo*, 176.
trachyrhynchus, *Cyrtopelicanus*, 313.
Tribonyx, 8, 9.
 Tropic Bird, New Holland, 295, 299, 300.
 — —, Ruddy, 295.
 — —, Westralian Red-tailed, 304.
 — —, White-tailed, 307.
Tropicophilus, 292.
 — *æthereus*, 292.
tunneyi, *Carbo fuscescens*, 180.
 —, — *gouldi*, 180.
 —, *Fregata ariel*, 288, 239, 274, 276, 287, 290.
Tyto, 94.
Urile, 162, 163.
urile, *Phalacrocorax*, 163.
Uroaëtus, 284.
vagans, *Anas*, 66.
 —, *Dendrocycna*, 62.

THE BIRDS OF AUSTRALIA.

- vagans*, *Dendrocygna*, 62, 65.
Vanellus cristatus, 185.
variegata, *Spatula*, 121.
varius, *Graculus*, 184.
 —, *Hypoleucus*, 162, 177, 184.
 —, *Phalacrocorax*, 162, 182, 183, 184, 186, 187.
versicolor, *Dendrocygna*, 68.
victoriae, *Oxyura australis*, 138.
Virago, 95, 4, 6.
 — *castanea*, 97, 95, 96, 98, 105, 106, 113.
 — — *castanea*, 98.
 — — *rogersi*, 102.
 — *gibberifrons*, 95, 100, 102, 106.
 — — *rogersi*, 102, 96, 98, 101, 112, 113.
Vulpanser tadornoides, 79.
Vultur, 201.

 Western Lesser Frigate Bird, 288.

 Western Musk Duck, 143.
 Westralian Red-tailed Tropic Bird, 304.
westralis, *Biziura*, 143, 146.
 —, — *lobata*, 144.
 —, *Carbo carbo*, 165.
 —, *Catoptropelecanus conspicillatus*, 315.
 —, *Pelecanus conspicillatus*, 315.
 —, *Phaethon*, 304.
 —, — *rubricauda*, 292, 302, 304.
 —, *Scaephæthon*, 291.
 —, — *rubricauda*, 304, 294, 303.
 —, *Tadorna tadornoides*, 79.
 Whistling Duck, 62.
 White-breasted Cormorant, 179.
 — -eyed Duck, 133.
 — -headed Frigate Pelican, 245.
 — -quilled Goose-Teal, 35.
 — -tailed Tropic Bird, 307.
whitei, *Hypoleucus varius*, 187.
 Wood-Duck or Maned Goose, 53.

SMITHSONIAN INSTITUTION LIBRARIES



3 9088 01571 2334



